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January, 1927.

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OF

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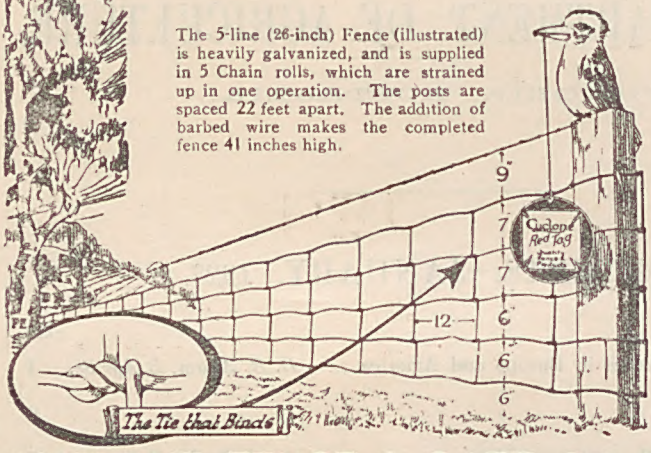

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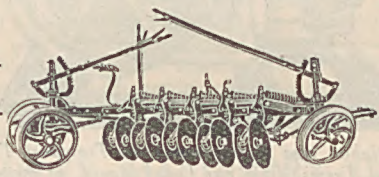

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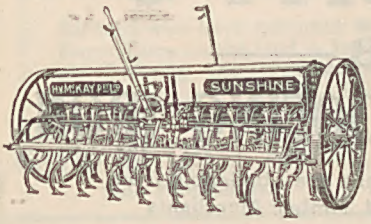

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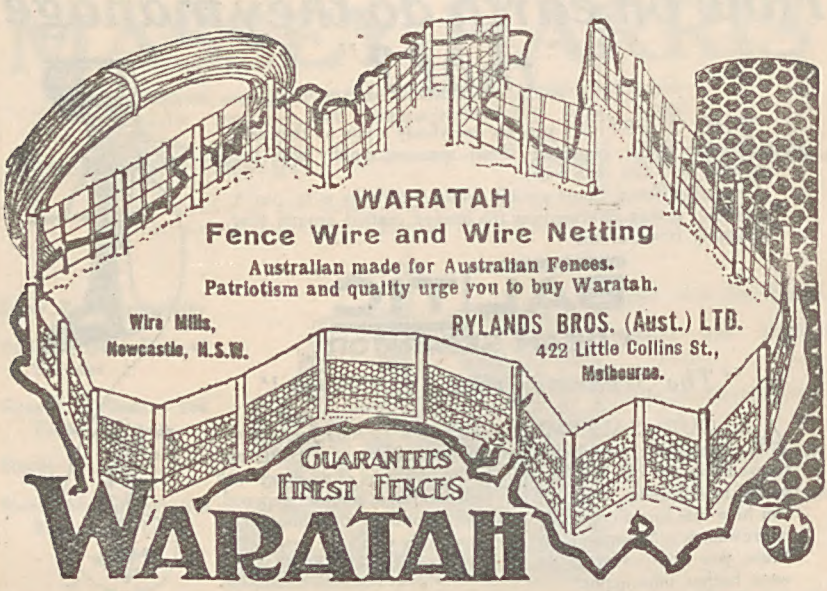

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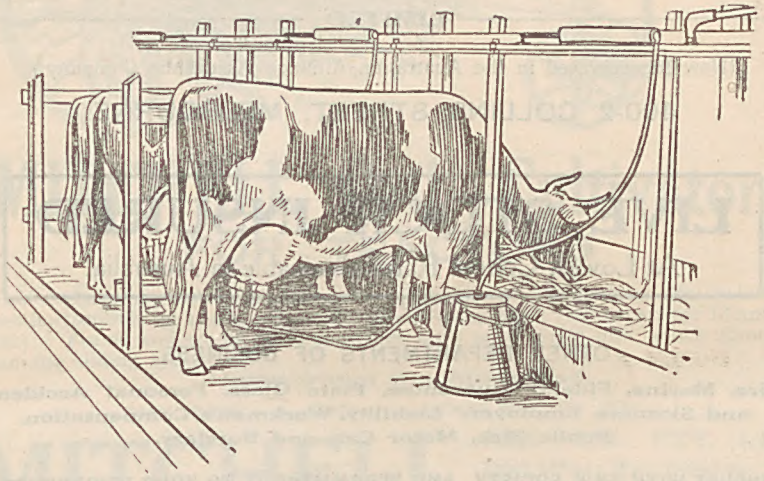

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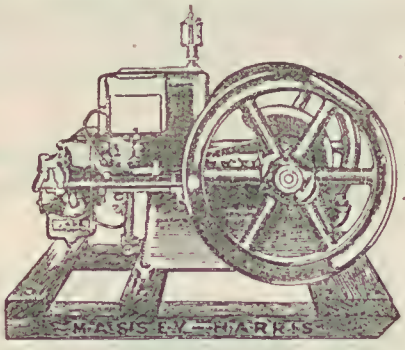

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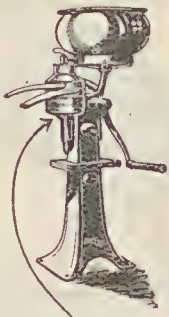

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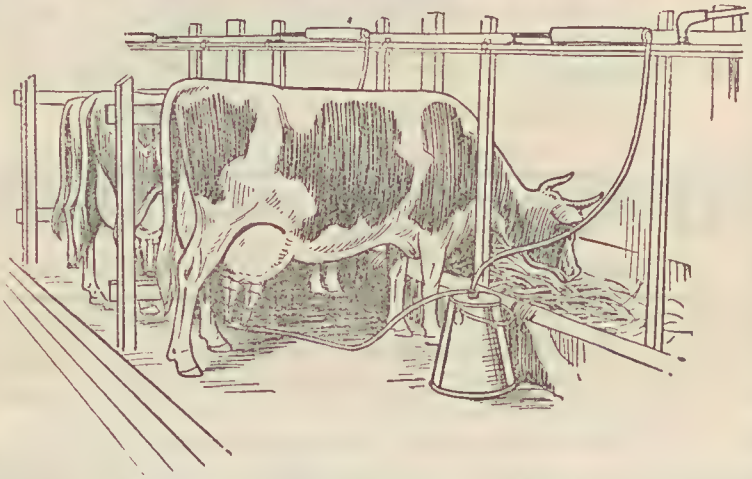

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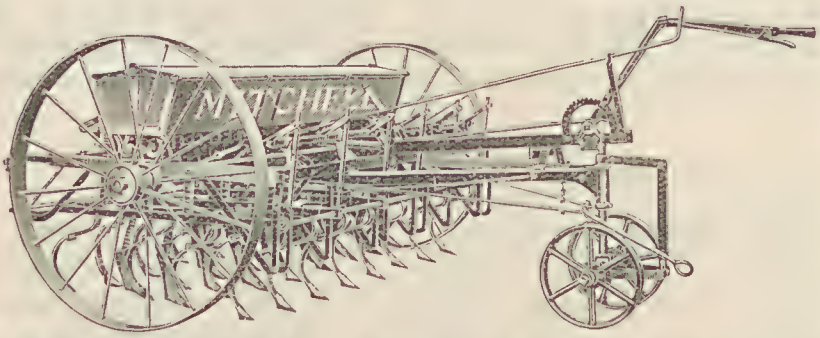

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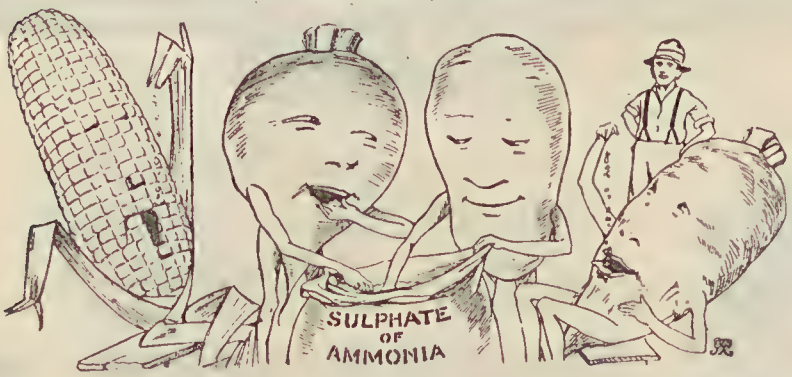

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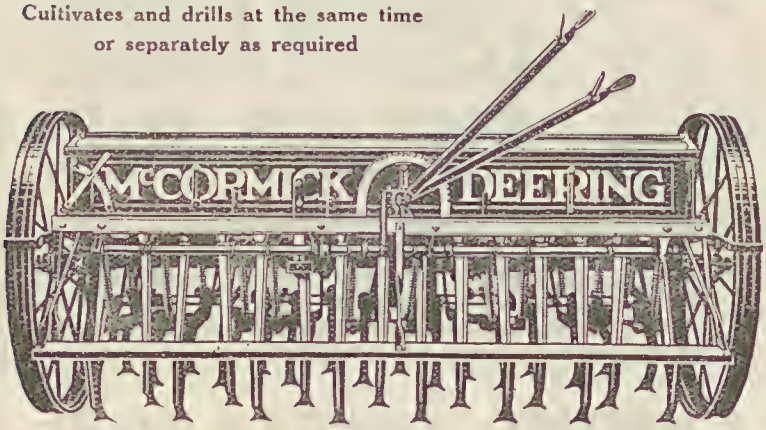

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Vol. XXV. January, 1927. Part 1.

PLANT PATHOLOGY.

STUDIES IN EUROPE AND AMERICA.

By D. B. Adam, B.Agr.Sc., Plant Pathologist.

Prefatory note by Dr. S. S. Cameron, Director of Agriculture.—A little over a year ago Mr. D. B. Adam, of the Science Branch of this Department, was commissioned to go abroad for a period of study on laboratory technique and method of research on plant diseases, in order that he might, with the knowledge gained throughout the tour, more efficiently organize and execute the investigational work that requires to be done in the domain of plant pathology in this State.

Mr. Adam spent a considerable time in the laboratories of the Imperial College of Science in England, and he was in association, for varying periods, with laboratories and science departments in other European countries and in the United States of America.

His investigations were broad-based, and ranged over a number of separate sections of plant pathological work.

It would appear that separate treatment of each of such sections is desirable, and consequently Mr. Adam will furnish a report under the following six headings, the first of which is published below:—

1. The Resistance of Plants to Disease:
   (*a*) The general problem;
   (*b*) Particular problems as illustrated by—
      (i) The resistance of maize to "seedling blight";
      (ii) The resistance of cereals to "rust";
      (iii) The resistance of potatoes to "late blight";
      (iv) The resistance of pears to "fire-blight";
2. The Potato Degeneration Diseases and "Seed" Certification.
3. Horticultural Conditions, with particular reference to the control of diseases in—
   (*a*) The Eastern American States;
   (*b*) The Pacific Coast States.
4. Cool Storage and Related Investigations in England and America.
5. English and Continental Institutions for the Investigation of Agricultural Problems.
6. American Institutions—
   (*a*) The Citrus Experiment Station at Riverside, Cal.;
   (*b*) The Hawaiian Sugar Planters Association Experiment Station, Honolulu, T. H.

THE RESISTANCE OF PLANTS TO DISEASE.

(*a*) The General Problem.

(*a*) *The General Problem.*—The common idea that the plant pathologist should prescribe a cure for plant diseases after the manner of a physician springs apparently from the faith in *materia medica* that finds its justification in human experience.

Application of specifics, particularly for the prevention of fungus diseases, has been, and still is, very largely used; but now, much more emphasis is being placed on control measures based on the disease-resisting power inherent in some individuals of practically all species of economic plants.

We may partially or fully control "bunt" in wheat, but what of the "take-all" disease? We may check the "late blight" of potatoes, but what of the "blue mould" of tobacco? In any case, the copper carbonate and the Bordeaux mixture used constitute an annual tax on production, which, if disease-resisting strains were used, could be avoided.

Although at no time has more energy been devoted to the study and improvement of seed disinfectants than at present, we are looking more and more to the rearing of resistant cereals to escape the "smut," which is an ancient affliction of the agriculturist.

The work of raising resistant varieties properly falls into the domain of three workers—the plant pathologist, the plant breeder, and the plant culturist. The work of the plant pathologist in the broader sense consists, first, in defining the exact conditions for a full expression of the disease—an aspect of the problem which has received a lot of attention at the Wisconsin Experiment Station by Professor L. R. Jones and his associates.

Correlative with this is work on the physiology of parasitism and the effect of environment on the fungus life cycle, which is being done at the Imperial College of Science and Technology, London, under the guidance of Professor V. H. Blackman and his associates.

The history of the rearing "yellows" disease-resistant strains of cabbage at Wisconsin shows how important a knowledge of the necessary environment for a disease may be. A dozen years ago, the strains evolved would show perfect resistance one year, whereas the following year 25 per cent. or more would be diseased. The disease resistance apparently varied with environment. Since climate varies from year to year, Professor Jones might say, "We could not, with equanimity, contemplate sending our pet cabbage seed even to trustworthy friends in Iowa and Virginia, when we knew not how badly their climatic conditions might upset our Wisconsin-made predictions."

One of the problems concerned in raising resistant varieties of plants is to isolate those having the qualities desired. The wheat-breeder, whose objective is a certain desirable type of ear, can, by careful use of his sight, make a choice of individuals grown from seed obtained by cross-fertilization; and in time he will "fix" the type so that it will breed true. But what indication or peculiarities are to guide him if his aim be the selection of plants that are smut-resistant—a quality that some of the plants surely have? The same may be said of practi-

cally all plant diseases, the resistance to which is not correlated with any physical feature in the plant. To determine their resistance, therefore, it is necessary to expose the plants to the disease in question; and to do this properly one must know the best conditions of soil, temperature, and moisture for the expression of the disease, if it be one emanating from the soil. Some diseases though, are affected in their incidence by conditions in the air environment, and so this, too, must be studied.

At the Wisconsin Station, by an arrangement of thermostatically-controlled electric heating elements in several soil temperature tanks, a series of soil temperatures, say from 4° C. to 32° C., may be provided. By adding definite quantities of water at intervals, it is possible to maintain a series of soils at approximately the same moisture content or at definitely different ones if required. With this apparatus, it has been found that certain diseases are very distinctly affected by a small variation in the temperature of the soil alone, all other factors being the same. Dr. J. Johnson, also of the Wisconsin Station, has evolved an air temperature and humidity control apparatus for studying the effect of this phase of the environment on diseases affecting the aerial parts of plants. With this apparatus, it has been shown that the symptoms of certain virus diseases may be masked at particular temperatures. This fact is obviously very important to the investigator seeking to isolate a strain resistant to one of such virus diseases. Looking for symptoms of mosaic on potatoes under certain conditions of temperature would be worse than searching for the proverbial needle in a haystack, for the reason that though the disease might be there, the symptoms would not.

The behaviour of the "seedling blight" disease of maize under different conditions of environment is an interesting example of a variation in resistance to disease under different conditions of soil temperature. Thus, in a relatively moist soil, at a temperature above 74° F., plants develop practically as well in the disease-infested soil as in the disease-free soil, while at a temperature below 60° F. the disease will occur in a serious form.

(Data obtained by the use of this environment control equipment is sometimes of wider use than for the solutio n of pathological problems.)

Maize is a crop which is grown very extensively in America. The use of cool temperatures in the soil temperature apparatus has shown that seedlings vary greatly in their cold-resistant abilities. This has enabled Professor Dickson and others to isolate strains of maize capable of growing well under the cool conditions prevailing in Wisconsin at a time when maize must be planted in order to mature a crop before the winter again sets in.

Resistance in most cases so far investigated has been only relative, a certain "breaking down" taking place in the best individuals of some strains in certain circumstances. This fact further emphasizes the value of information concerning disease expression under different soil conditions.

A more obscure phase of the plant pathologist's work consists in ascertaining the nature and cause of disease resistance. This work is intimately associated with the physiology of parasitism, the actual mode of infection, and factors determining it. By some it is thought that penetration is purely a mechanical affair, which notion leads to

certain ideas as to the nature of resistance; others ascribe penetration to a slow diffuse chemical solution by the penetrating fungus, which leads to another line of thought as to the nature of disease resistance. Both of these ideas are receiving considerable attention as matters of scientific interest, but at present are of only remote practical interest.

Having determined conditions for the disease, one must seek a likely place for the desirable resistant individual. In many cases, such individuals only require recognition by us. In others, the desired quality exists in an otherwise unsuitable individual, and can only be grafted on to desirable plants by hybridization. In a few cases one must seek the desired individual or quality in foreign lands.

Methods of investigation which were observed by the writer may best be illustrated by reference to particular problems, as follow:—

I.—The Resistance of Maize to "Seedling Blight."

The "seedling blight" of maize is caused by a fungus *Gibberella saubinettii* (Mont.) Sacc., and, as mentioned earlier, is a serious disease in a cold soil. It is a curious fact that the same fungus also produces "scab" and "seedling blight" of wheat, but here it is a serious disease only under relatively warm conditions.

In the earlier experiments with maize at Wisconsin, a limited number of seedlings would grow healthily at low temperatures, even in disease-infested soil, indicating the presence of resistant individuals merely requiring isolation and "fixing."

Applying the knowledge gained as to the incidence of the disease, plants were grown from seeds which were steeped in a spore suspension and were planted early in the season, that is, in cool soils, the temperature of which was ascertained with soil thermographs. The number of seedlings that can be tested in this way is large compared with the quantity that could be tested in the controlled soil temperature tanks.

The best plants showing desirable characteristics were selected and self-pollinated to purify the strain. This selection and self-pollination were continued over a number of years under favorable conditions for the disease till the strains bred true for their resistance to disease. After a few years of selfing, to regain vigour, it is necessary to cross-pollinate two or more of such resistant strains, the maize plant normally being cross-fertilized.

By the system of self-pollination for a number of years, avoiding all out-crossing, improvement and fixation of type have been much more rapid than is possible with individual selection, even within a strain.

II.—The Resistance of Cereals to "Rust."

"Rusts" annually exact a heavy toll from the American farmer, and so the development of a rust-resistant wheat is one of the most urgent problems facing their plant pathologists. Most of this work has been done at the Minnesota Experiment Station, St. Paul. Dr. Stakman and his associates have found that there are about 40 closely similar biologic forms of the rust fungus which attack wheat. Many of the existing varieties of wheat are resistant to a number of these forms of rust, but not one is resistant to them all, a condition necessary for resistance since any of these forms of rust may be present and so infect the plants. The apparent "breaking down" of rust resistance in

certain reputedly resistant wheats may probably be accounted for by the fact of exposure of the plant to a slightly different form of the fungus. The resistance of the common varieties of wheat to the different rust forms is known, and crosses are arranged so as to combine in the progeny the resisting powers of the parents and so on, until a wheat resistant to all forms of the fungus is built up.

To ensure infection, a nursery plot about 40 yards square, and containing head-row selections of the various crosses, and a standard variety as checks, are set out. Around the plot are two or three rows of wheat of Little Club and other varieties, which in the aggregate are susceptible to all the known American forms of the fungus. Wheat plants infected with the different forms of rust are planted among these outside rows, while others are used for making a suspension of spores with which to inoculate the foliage of these plants under suitable conditions. When these rows are fairly affected, plants are taken up and used as brushes to inoculate the plants in the nursery, while others are shaken up with water and the spores sprayed on at a time when the plants are likely to remain moist long enough to allow infection to take place. This inoculation may be repeated from time to time. A promising variety might have to go through eight seasons of subjection to artificial rust epidemics; thus the chances of escape, if the wheat is susceptible, are small.

III.—The Resistance of Potatoes to Late Blight.

Late Blight is a disease caused by a fungus which infects the leaves of the potato plant under certain climatic conditions. In Germany, at the Imperial Biological Station, resistant varieties are being produced by hybridizing resistant wild South American varieties with susceptible cultivated varieties.

The method of testing these hybrids consists in making a suspension of the fungus spores, which produce secondary spores capable of infecting susceptible plants, and dropping a little of this suspension on the leaves of plants to be tested. These plants are placed in glass chambers where temperature and humidity are favorable to infection. Certain plants showing a very high degree of resistance to infection were seen.

At present, experiments are progressing to test whether this capacity for resistance is perpetuated in the tuber; further work to improve the horticultural qualities of the strains will be necessary. The work is also being used as a basis for ascertaining the nature of resistance to disease.

IV.—The Resistance of Pears to "Fire-blight."

"Fire-blight" is a serious disease of pears and apples caused by a bacterium. The losses ascribed to it in some years reach an astounding figure. The method adopted at the Southern Oregon Experimental Station illustrates very well one of the few short cuts possible to workers wishing to avoid losses from diseases by the use of natural resistance.

Fruit trees are such comparatively slow-growing plants, and their genetic composition so mixed and little known, that any chance a worker might have of adding on disease-resistant qualities to an otherwise desirable tree by crossing and selection would be extremely remote.

In actual practice, it happens that trees may be saved if the organism has not penetrated to and established itself in the roots or the main limbs.

By a series of inoculation tests with pure cultures of the "fire-blight" organism, using shoots in their most susceptible state, it has been found that all the ordinary cultivated pear varieties are susceptible, some of the most desirable being extremely so. On the other hand, various Chinese or Sand pear varieties show quite marked resistance.

These features have been utilized to construct trees in which the most vital parts, the roots and main limbs, are of resistant species of pear, while the top, fruitful portion consists of the particular variety desired.

Difficulties apparently bound up with the question of affinity of stocks and scions compel the use of an intermediate variety between the roots and the smaller branches. At present the best trees appear to be those with "Calleyana" roots, "Old Home" for an intermediary scion, and the desired variety "worked" on top.

(*To be continued.*)

SHOEING BULLOCKS.

A novel sight was witnessed at Maffra on Wednesday last when Mr. Jack Wilson, known throughout Gippsland as an expert handler of working bullocks, and who is now engaged on a contract for the Water Commission to transfer piles and timber from the Commission area on the cemetery road to the new operations from Bundalaguah to Myrtlebank, brought six of his team in to be shod. His team comprises fourteen bullocks, and they went foot-sore on the gravelled roads, rendering it necessary for slippers. This team, prior to that, had been working in the Orbost district conveying logs to the railway station. He had perforce to leave that locality, as the Prince's Highway was closed by the Country Roads Board and Shire Councils, as it was reckoned that such team work tore up the roads too much, so he turned his attention to the more settled country of Boisdale, where he has his habitation. He brought six of his team to Mr. E. L. Pleydell to have slippers put on, and it proved a laborious job, and took practically all day to finish off five of the animals. The slipper is a semi-circular span of steel placed on each side of the cloven hoof, with a clip at the toes. Before being operated on, each bullock was tied to a fence. The quiet ones submitted docilely to the ordeal, but some unruly ones objected to the operation and had to be thrown, and submitted willy nilly to the indignity.

One bullock, a Polled Angus, did not take things too kindly, but after some strenuous endeavour the recalcitrant beast was shod. Next morning he had not forgotten the episode, and refused to yoke up, so it was deemed advisable to give the quintette a day's rest. The balance of the team are to be put through their shoeing operations on Wednesday next, and Mr. Wilson considers it will not be so exciting, as the most irascible have been shod.

—*Gippsland Times*, 13th September, 1926.

WHEAT CULTIVATION.

MANURING THE CROP.

An Address by J. Brake, B.Agr.Sc., Senior Inspector of Agriculture, broadcast through 3LO.

Increasing the productivity of the land, or even maintaining its fertility, is largely dependent on three main factors:—

First.—The methods of cultivation employed.

Second.—The application of manures.

Third.—The cropping rotation adopted on the farm.

All three are very closely related; indeed, the practice of any one for the greatest profit necessitates the use of the other two, so that I would like you to remember that manuring is only one of the operations concerned in crop production, and actually takes second place to cultivation.

Thorough tillage of soil, supplemented by judicious manuring, is the foundation of successful cropping.

It may be asked by some, "Why should plants require manure? Provided the soil is properly prepared, should not nature do the rest and grow the crop?"

On some soils, nature does grow the maximum crop without any help from manures, but she is unable to do this if there is a shortage of any of the foods required.

There are ten foods necessary for the growth of a plant—carbon, hydrogen and oxygen (which are obtained from the air and water), nitrogen, sulphur, phosphorus, potassium, iron, magnesium, and lime (obtained from the soil).

Some of these are required in greater quantities than others, but however small a place in the make-up of a plant any particular food occupies, unless that small quantity be available maximum growth cannot be attained.

In other words, the yield of the crop primarily depends on the presence of a sufficiency of each one of the plant foods. The object of manuring, then, is to make good any food deficiencies.

It is interesting to note that of the total food taken in by the wheat crop, 93½ per cent. comes from the air and the rain, 3½ per cent. from minerals found abundantly in the soil, whilst 3 per cent. is derived from nitrogen, phosphorus, and potash, any one of which is liable to be present in the soil in quantities insufficient for plant growth.

Naturally enough then, it is our business to make sure that the plant actually obtains sufficient nitrogen, phosphorus, and potash to make up 3 per cent. of the total food requirements.

Most people would immediately say, "Well, that's easy enough; carry out a chemical analysis of the soil, and there you are!" But it is not quite so simple.

The chemist is able to accurately determine the amounts of each plant food in the soil, but the all-important question to the plant is, not how much is present in the soil, but how much is actually available to it as food. Plants require all their food in solution, so that if the food is present in the soil in an insoluble form it is not available.

Experience has shown that the most satisfactory way of ascertaining the manurial requirements of crops, is to carry out comparative tests in the field by growing a crop treated with one manure alongside a similar crop treated with another. If all other conditions for the two plots are identical, then we can say that any increased yield one way or the other is due to the manurial treatment received.

This method has been adopted by the Department of Agriculture, and, at the present time, tests are being conducted on the State farms and also on supervised experimental plots throughout the wheat-growing areas.

At the State Research Farm at Werribee, a comprehensive range of manurial trials was laid out in 1912, by means of which has been determined the effect on yields of wheat of various manures applied singly and in combination—such as superphosphate, farmyard manure, nitrate of soda, sulphate of potash, bone fertilizer, Thomas's phosphate, and lime.

Similar tests have been conducted on the Departmental plots at Longerenong College, in the Wimmera, and also at the Rutherglen State Farm in the north-east, with identical results.

The influences observed on the yield of wheat appear to justify the following conclusions:—

(1) Superphosphate is the most profitable of all artificial manures that can be applied to the wheat crop.

(2) There is no evidence in support of the statement that the continual use of superphosphate is doing material damage to the ultimate fertility of the soil.

(3) The quantity of super. that can be profitably applied per acre is considerably in excess of that usually applied in the wheat areas.

(4) The indirect effect of the heavier dressing in stimulating the subsequent growth of the grass and increasing the stock-carrying capacity of the land is much greater than that of the lighter dressing.

(5) Thomas's phosphate, applied either separately or in combination with superphosphate, gives less profit than the same quantity of super. applied by itself.

(6) Lime, applied either in heavy or light dressings, has not, so far, profitably influenced yields of wheat at Werribee.

(7) Nitrogenous and potassic manures do not profitably increase the yields, especially when bare fallowing is practised.

We have seen that, of the foods necessary for the growth of plants, seven are always available in abundance; whilst, generally speaking, there are likely to be shortages only in the remaining three—nitrogen, phosphorus, and potash.

Further, the tests carried out under Victorian conditions (already mentioned) show that, of these three, phosphorus is the only one which gives a profitable increase in yield.

Thus, by elimination, phosphorus has shown itself to be the only manure we have to supply, as such, to the wheat crops on Victorian soils. The economical and wisest procedure to adopt then is to utilize the small experimental plots in the various districts of the State for

determining the most profitable amounts of phosphatic manure to apply, and at the same time to keep a few representative tests going with all the manures. And that, in effect, is what the Department of Agriculture is doing to-day.

Accepting that phosphatic manure is required, and that, generally speaking, it is the only one required for all our wheat-growing districts, it next becomes necessary to determine the exact amount to be applied in each district to give the maximum profit. This is done by means of the district experimental plots, which I will now briefly describe:—

The usual procedure is for the Department to lease an area of 10 acres of uniform land from a farmer, and to supervise the cultivation, sowing, and harvesting of a series of plots on it laid out as follows:—Quarter or half-acre plots are sown at the same rate per acre with, say, Federation wheat on the same day. Varying quantities of superphosphate are applied, e.g., plots No. 1, 2, 3, 4, and 5 are treated with 30 lb., 60 lb., 90 lb., 120 lb., and no manure rspeectively, the no-manure plot being included as a check.

To indicate the results that are being obtained from tests of this kind, allow me to quote results from two or three of the fields.

At the Warracknabeal plots, over a period of twelve years, the plots treated with no manure, ½ cwt. super., 1 cwt., and 1½ cwt. per annum, gave average yields of 15 bushels, 21.3 bushels, 23.2 bushels, and 24.3 bushels per acre; that is, the ½ cwt., 1 cwt., and 1½ cwt. of super. dressings gave increases in yield over that of the no-manure plot of 6.3, 8.2, and 9.3 bushels per acre; or if we take wheat at 5s. per bushel and superphosphate at 5s. 6d. per cwt., the net profit, after deducting the cost of manure, was 28s. 9d., 35s. 6d., and 38s. 3d. per acre for the dressings of ½ cwt., 1 cwt., and 1½ cwt. of superphosphate respectively.

It will be noticed that the increase in yield from each additional ½ cwt. of super. applied diminishes steadily as the dressing increases. There comes a time when the cost of the additional super. is greater than the return from the increased yield; e.g., at Goroke, over a four-year period, the increase in yield for the first cwt. of super. over the no-manure plot was 5.03 bushels per acre, whilst the increase for 2 cwt. of super. was 5.86 bushels per acre. After deducting the cost of the manure in each case, it is found that the net profit from the 1 cwt. application is 19s. 7d. per acre, whilst that from the 2 cwt. application is only 18s. 3d. per acre.

From facts such as these is formulated the *Law of Diminishing Returns*, which states that—

> "For each additional quantity of manure applied to a crop, there is a corresponding increase in yield until a point is reached, beyond which additional manure brings no further increase."

This law illustrates the importance of conducting careful tests to determine the quantity of manure necessary for the greatest profit.

This quantity varies with the district and the soil. For instance, at Cowangie, near Murrayville in the Mallee, the average results of ten years show that 90 lb. of superphosphate returns the greatest profit. On the other hand, on the rich black Wimmera soil at Longerenong, the maximum profit is obtained from a dressing of 2 cwt. per acre. At

Shepparton, on the Goulburn Valley clay soil, 1½ cwt. per acre has been found to be the best.

I mentioned, early in this paper, that manuring was only supplementary to cultivation. This statement is borne out when we come to the determination of the final few pounds to be applied.

A heavier dressing of superphosphate can never make up for bad or neglected cultivation; or, put in another way, imperfectly-cultivated fallow or a badly-prepared seed-bed cannot make profitable use of maximum dressing of manure.

From the foregoing, it is apparent that superphosphate is playing a very important part in the wheat production of the State. Introduced to Victorian farmers by Mr. A. N. Pearson and Dr. Howell, of the Department of Agriculture, about 1900, it made itself evident in an immediate rise in yield per acre. Further benefit was obtained from its use because of the more general adoption of fallow, the value of which was conclusively demonstrated in the 1902 drought.

And so, during the last 25 years, as cultivation methods improved, it has been possible to increase, with profit up to eight-fold, the quantity of super. applied per acre.

The increase in the amount of super. used shows a close correlation to the general advancement in wheat-growing in the various districts. For instance, in the Wimmera, where the average yield per acre has steadily risen during the last twenty years from 7½ to 22½ bushels per acre, the quantity of super. applied has risen, in like manner, from 33 lb. to an average of 88 lb. per acre.

In the Goulburn Valley, on the other hand, where the increase in average yield has been very small—the rise has been only from 9 to 15 bushels per acre—the quantity of super. used has shown barely any increase whatever.

Superphosphate is manufactured by the addition of sulphuric acid to the insoluble rock phosphate, which is imported from some of the Pacific islands. It is sold in the form of a powder, which renders it suitable for sowing through an ordinary seed drill. Experiment has shown that it is desirable that the super. should be placed in the soil right against the seed.

The idea that weed seeds are spread through the country in a sand-filling in superphosphate is quite wrong. In the new 22-per-cent. superphosphate it is seldom necessary to regulate strength by putting in any sand at all, but even if sand were used, any seeds present could not possibly live through the extremely high temperature generated during manufacture.

The effects of superphosphate can be stated briefly as—

(1) An increase in the cropping capacity of the soil.
(2) Greater root development in both width and depth.
(3) Quick early growth of the plant. (Plants require more phosphates during early stages of growth than in the later stages.)
(4) Gives an early maturing crop. (Manured crops ripen earlier than do unmanured.)
(5) Lowers the water requirement of the crop. (A very important point in our dry wheat-growing areas.)

(6) Finally, the application of superphosphate enables the crop to better withstand disease. (This was well illustrated at Nhill two years ago, when there was a considerable amount of the disease "Take-all" in the wheat crops. When the crop of Messrs. Rintoule Bros. was being judged, it was noticed that the drill had not sown any super. for part of one round. The crop on this unmanured portion was riddled with "Take-all," whilst the remainder of the crop, which, of course, had been manured, was comparatively free from the disease.)

In closing, I might mention that wheat yields, on certain clay soils may be increased still further by the application of gypsum in addition to the superphosphate.

The action of gypsum, however, is not manurial, but is of a purely physical nature, improving the soil conditions under which the plants have to grow.

INTER-CULTIVATION OF THE POTATO CROP.

By J. T. Ramsay, Potato Expert, broadcast through 3LO on 3rd December, 1926.

Why Inter-cultivation is Necessary.

In concluding my previous broadcasting* I emphasized the advisability, after the planting of the potato crop, of keeping the surface of the soil stirred frequently with the harrows. The weather which has been experienced since that talk has more than proved the necessity for such operations being systematically carried out.

There are various important reasons why the soil should be cultivated after planting and during the growing period of the crop. The more important of these I shall explain here. First and foremost is the fact that well cultivated soil is capable of absorbing and retaining moisture to a much greater degree than soil which is compact or hard. I have already dealt rather fully with moisture movement in soil, but this point—the conservation and maximum utilization of water in the soil—is of such tremendous importance, that it will not be amiss to repeat—in part—something already said on this subject.

Moisture in soil after percolation is complete, moves upward to the surface from the lower levels by what is known as capillary movement. If the atmospheric condition be drier than the soil condition, the moisture is evaporated slowly or quickly according to the degree of variation of the moisture content of the soil and air. Under conditions very favorable to evaporation this loss of water from soils can proceed at a very fast rate. Capillarity at a high rate is possible only when the water film can move upwards over soil particles which are closely packed together. Surface cultivation loosens the particles of soil to the depth of the cultivation, and increases the bulk of the space which they occupy. This causes the capillary movement of the soil

* See this *Journal* for November, 1926.

moisture to be arrested practically at the depth of the loose soil, and so conserves the moisture for the use of the crop. The importance of this inter-cultural operation can be easily realized when consideration is given to the fact that the potato is a moisture-loving plant, and to the fact that during its growing period we are, in Australia, normally subjected to periods—more or less protracted—of warm to hot, dry weather.

Why Moisture in the Soil is Required.

The presence of water in the soil for the crop is imperative, to allow natural or artificial fertilizers and the root system of the plant to function. Plant food is absorbed from the soil by the roots of plants, and transmitted to the portion above ground by a process known as osmotic movement, and these movements are possible only in the presence of water. It will be understood from this that if a free absorption of plant food from the soil has to take place, such as is essential for the full development of the plant, then the amount of water requisite for the needs of the plant must be available. Where irrigation is practised the water requirement can be given artifically, but where the natural rainfall is depended upon it may be—in the incidence of its falling—unsuited to supply the requisite continuance of moisture necessary for the uninterrupted growth of the crop. Cultivation, therefore, because of its moisture conserving effect on the soil, is vitally necessary to tide the plant over periods of insufficient or erratic rainfall.

Other Benefits of Inter-cultivation.

The second important effect on a crop produced by good inter-cultivation is that the physical condition of the soil is maintained at a good standard, thus permitting a sufficiency of aeration to take place. This has the effect of promoting the action of beneficial bacteria, for which air is necessary if they are to carry out the functions of breaking down insoluble plant foods in the soil, and to make these available as food to the plants.

Inter-cultivation, further, by improving the mechanical condition, permits freer root ramification and extension in search of the elements of fertility. As an illustration of the extent of root development which is possible within one month from the date of planting—under, of course, the best physical and chemical conditions—I can cite a case met with in the course of a certain experiment carried out some years ago. In this case the whole of the root system of a plant was harvested at one month from the date of its being planted in highly fertilized sand, and when measured, prior to being subjected to chemical analysis, the longest root was found to be over 20 inches in length.

Good mechanical condition, too, has a very large influence on the shape of the tubers. In hard or compact soil the tuber, when increasing in size, meets with restriction which causes deformity of the natural shape of the particular variety grown. In well-cultivated soil, however, the tuber is free to expand without restriction, and so develops to full size with more perfect shape. The last principal effect of inter-tillage—and not the least—is that foreign plants or weeds are kept in subjection or entirely killed—thus permitting the crop to benefit to the full extent from the plant food and moisture content of the soil.

Methods of Inter-cultivation.

HARROWING AND HOEING.

Now as to the actual operations incidental to inter-cultivation and the implements used to carry out these operations. First, there is the harrow. Harrowing is the cheapest form of cultivation utilized in agricultural practice. By its employment a large area of ground can be cultivated to a shallow depth in the course of a day at very small cost per acre. Because of the cheapness of this method of inter-cultivation, advantage should be taken by potato-growers to utilize it whenever they can in order to keep down production costs per acre.

After planting, and until the crop is well up in the rows—even to a height of 4 or 5 inches—effective work in preserving good surface tilth can be done by harrowing at frequent intervals of, say, one week each. In the event of rain falling during this early stage of the crop's growth, advantage should be taken, as soon after the fall as the ground is in working condition, to run the harrows over the surface to prevent caking, or baking, of the top, and to imprison the water precipitated.

Frequent harrowing at this stage is a most excellent and economical means of killing off weeds as they germinate, and, if done systematically, will eliminate the necessity for much weeding later on. Once the plants reach the height of 4 or 5 inches, subsequent cultivation, up to the time when they are about in full bloom, must be confined to the horse hoe. The horse hoe is an implement designed specially for cultivation between the rows of any growing crop. It is capable of being adjusted in the width and depth of cut to suit the requirements of any stage of growth of the crop.

This implement is now procurable for operating in one, two, or three rows at a time. The double and treble row cultivators are most suitable for both speed and economy to large growers. For instance, the three-row horse-hoe can be worked in the majority of soils by two horses controlled by one man—whereas in working the single row horse-hoe, three men and three horses would be required to cover the same ground in an equal amount of time. It is not possible to give any hard and fast rule as to the number of horse-hoeings that should be given to the crop, owing to the wide variations of soil textures and seasonal conditions, but it may be safely advised that there should not be less than three during the season. The intervals of time between the hoeings will also vary with the seasons and the rate of growth of the crop, but a rough distance of time between each horse-hoe cultivation should be about a fortnight. One point, however, that can be strongly advocated here is that opportunity should be made to horse-hoe as soon after rain as possible, and this for the same reason as has been advanced for harrowing after rain, viz., the re-conditioning of the tilth and the conservation of water.

The first hoeing of the season should be done at the greatest depth at which the team can manage the implement, and at as wide a distance as possible without unduly disturbing or damaging the plants on either side. Each subsequent hoeing should be at a narrower and a shallower width and depth in order to accommodate the cultivation to the increased growth of the plants. If the season permits an approximation to these suggested times of hoeing, the plants normally should be just coming into full bloom by the time the third cultivation is given.

Removing Weak and Foreign Plants.

At this stage opportunity should be taken to go through the crop in order to remove any obviously weak plants and destroy them, as they are not only non-productive and unfit for use as seed or for consumption, but they are potential carries of disease to a succeeding crop.

Rogueing, or the removal of plants not true to the variety supposed to be grown, should also be done. It is only at this stage that an accurate judgment can be made as to whether the whole of the plants growing are of any particular variety. When in full bloom the foreigners to the variety desired can be observed at a glance by the colour of the flower, or by the character of the haulm, or by the peculiarity of the leaf shape or its structure. Later it is most difficult, and in some cases almost impossible to identify certain varieties from each other. The growth of pure parcels of any particular variety is most desirable. Where varieties are mixed, yields are often lessened owing to the differences in the period of maturation in them. Rogueing at this stage is a profitable operation, particularly when it is intended to market the produce as seed. Seed parcels of mixed varieties have a low cash value comparatively. Parcels of seed which are pure command a figure always above current market prices.

During the seed season each year I receive numbers of queries from intending purchasers as to where they can procure pure parcels of some particular variety. Before the season is far advanced I often find it very difficult to recommend sources of supply of pure stocks, so careless are many growers in the matter of keeping their varieties separate. The sale of seed is the cream of the potato trade, and rogueing when the plants are in bloom to eliminate strangers is one way to get a share of this cream.

Hilling.

The next operation in inter-cultivation is the hilling or moulding up of the plants in the rows. This is an advisable operation for two reasons—first, it saves the tubers formed near to the surface from being scalded by the sun or greened by the action of light. Tubers greened by exposure are unfit for consumption, being bitter to the taste and mildly poisonous, owing to the development of solanum. Cases are on record where stock have actually died from being fed on greened tubers.

Another very important result effected by hilling is that the tubers are protected from attack and damage by the grub of the potato tuber moth (*Lita solanella*). In a season (hot and dry) when the moth and grub are best suited for their rapid increase, a crop which is unprotected by hilling may be riddled in less than a week by these grubs, and rendered valueless. Good hilling, combined with good tilling, is a safeguard against loss from this source, up to the point of digging.

A further benefit from hilling up the crop is, that digging, either by machine or hand, is facilitated, as the machine or fork can be projected with greater ease to a depth slightly below the level of the deepest tubers.

Last season during a very dry spell from the middle of January to the middle of March, while discussing crop treatment as far as inter-cultivation was concerned, with numbers of growers throughout the State, I had occasion to remark to them on their lack of sufficient inter-cultivation. The explanation I received was the same in practically all cases, viz., that the ground was so dry, and the weather

so warm, that they thought more harm than good would result from disturbing the soil under such conditions. Accordingly, I instituted at the main Departmental Potato Experimental Station at Millbrook a trial to test whether this notion was well founded.

Portions of the paddock, similarly treated otherwise, were given, respectively, one, two, and three horse hoeings with intervals of about a fortnight between each. No rain fell until after the final horse-hoeing had been given. Another cultivation would have been given, but in the meantime the plants had become too big to permit of this. The results obtained were illuminating, and are recorded below. (The weights mentioned are those of market-size tubers only.)

	Tons.	cwt.	qrs.
One cultivation after planting	3	12	2
Two cultivations after planting	4	5	1
Three cultivations after planting	5	14	0

The moral of this is expressed pithily in a slogan displayed in the potato section of the Better Farming Train, which reads, "Keep the horse-hoe hoeing."

FRESH GRAPE EXPORT INVESTIGATIONS.

By François de Castella, Government Viticulturist.

The export of fresh grapes was dealt with at some length by the writer in the February, 1926, issue of this journal. During the year that has closed, the subject has received further attention, and experiments have been conducted which may be here recorded.

Foremost among these is the experimental shipment to London per s.s. *Moreton Bay,* of the Commonwealth Line, of 114 cases of Ohanez grapes on 14th April, 1926. Three small shipments were also made to Dunedin, New Zealand, the presence of an Australian representative at the Dunedin Exhibition affording facilities for obtaining reports on the condition in which the fruit reached its destination. Cool storage experiments were also carried out at the Government Cool Stores, as in previous seasons. They comprised control experiments with grapes from some of the vineyards which supplied the *Moreton Bay* shipment as well as experiments with grapes of different varieties from the Rutherglen Viticultural Station. These were treated in various ways, including fumigation with sulphur dioxide.

The climatic conditions prevailing at Almeria (Spain) are further dealt with, in the light of recent information received from the Agent-General. Brief mention is also made of the shipment of grapes wrapped in paper and packed with wood wool, a style of packing successfully used by South African growers for some years past.

Experimental Shipment per s.s. "Moreton Bay."

Disheartened by the unsatisfactory results of 1924 and 1925 grape shipments, our Ohanez growers did not try the London market last season, though 1,422 cases were shipped to Colombo and eastern ports (mainly Sourabaya, Singapore, and Batavia) and 298 to New Zealand.

Convinced that recent failures were due to abnormal climatic conditions, and that they did not invalidate the feasibility of successful

grape shipment, the Department of Agriculture decided, early in the year, to make an experimental shipment to London of grapes purchased outright from growers, the Department thus standing the risk.

The shipment consisted of 114 cases of grapes of the Ohanez variety, packed in granulated cork filler. The following is a detailed statement of the marks, numbers, and sizes of the cases, as well as the treatment of the grapes and the names of growers by whom they were supplied:—

Mark A.—Grapes not sulphured; untreated cork; three-quarter bushel cases.
Nos. 31, 32, and 33—Grown by Mr. Constable, Merbein.
Nos. 107, 108, and 117—Grown by Mr. T. Parker, Shepparton.
Mark B.—Grapes not sulphured; treated cork; three-quarter bushel cases.
Nos. 1 to 10—Grown by Mr. McMillan, Merbein.
Nos. 34 to 40—Grown by Mr. Constable, Merbein.
Nos. 77 to 80—Grown by Mr. Woods, Merbein.
Nos. 83 to 90—Grown by Mr. Woods, Merbein.
Nos. 109 to 115—Grown by Mr. Parker, Shepparton.
Mark C.—Grapes sulphured; untreated cork; three-quarter bushel cases.
Nos. 41 to 43—Grown by Mr. Constable, Merbein.
Nos. 116, 118, and 119—Grown by Mr. Parker, Shepparton.
Mark D.—Grapes sulphured; treated cork; three-quarter bushel cases.
Nos. 11 to 13—Grown by Mr. McMillan, Merbein.
No. 18 and Nos. 24 to 28—Grown by Mr. McMillan, Merbein.
Nos. 44 to 50—Grown by Mr. Constable, Merbein.
Nos. 71 to 76—Grown by Mr. Woods, Merbein.
Nos. 120 to 126—Grown by Mr. Parker, Shepparton.
Mark E.—Grapes not sulphured; untreated cork; bushel cases.
Nos. 21 to 25—Grown by Mr. McMillan, Merbein.
Nos. 51 to 55—Grown by Mr. Constable, Merbein.
Nos. 61, 63, 69, and 70—Grown by Mr. Woods, Merbein.
Nos. 127 and 128—Grown by Mr. Parker, Shepparton.
Mark F.—Grapes sulphured; treated cork; bushel cases.
Nos. 26 to 30—Grown by Mr. McMillan, Merbein.
Nos. 56 to 60—Grown by Mr. Constable, Merbein.
Nos. 62, and 64 to 68—Grown by Mr. Woods, Merbein.
Nos. 129 and 130—Grown by Mr. Parker, Shepparton.

The numbers are not consecutive. The grapes were supplied by different growers and several numbers had to be short shipped. These were to be supplied by a grower at Woorinen, near Swan Hill, but owing to very heavy local rain at this place, the grapes were not in fit condition to ship.

The grapes from Merbein were despatched from the local railway station on 7th April. They went into the Government Cool Stores at Victoria Dock, Melbourne, on the 9th. They were thus pre-cooled from 9th to 14th April. The Shepparton grapes were picked on Saturday, 3rd April, just before the heavy rain of that week end. They were forwarded on 7th April and cool stored at the Government Cool Stores the following day.

The cases were all wire bound on arrival at the Government Cool Stores. They were fitted with "Climax" insulators; these are small cardboard wads, nailed to the corners of the cases, to prevent close stacking and thus permit air circulation through the stack. An air space of $\frac{3}{8}$ inch is thus provided.

The objects of the shipment were mainly to test the following points:—

The Form of Package.—Two types of case were used. Marks A to D inclusive, were packed in the flat ¾-bushel case—24 in. x 6 in. x

11¾ in., with transverse partition. This is the case mainly used for grape export during the past few years. It was intended that these should be packed with 25 lb. grapes and 5 lb. cork filler, but, as will be seen below, the gross weight varied somewhat.*

Marks E and F were packed in the bushel case—20 in. x 10 in. x 11½ in., without partition, known as the "Canadian bushel," and used to some extent for packing apples. This case was held in some quarters to be superior to the flat ¾-bushel case, the grapes bulking better in it, and owing to its squarer shape being less liable to be banged to the floor in handling. As will be seen below, the grapes in these cases showed no superiority on arrival, nor did they fetch a high enough price to compensate for the extra weight of grapes contained. There seems to be no good reason to depart from the popular ¾-bushel case.

Special Treatment of Cork Filler.—This appears to be the direction in which hope of complete success in grape shipment chiefly lies. Its importance will be understood when the danger of infection by mould fungi is viewed in its true light. Mr. S. Fish, B.Agr.Sc., deals elsewhere in this issue (see pages 31-39) with the different fungi that must be reckoned with and the means by which they can best be avoided.

The special treatment to which the cork was subjected was described by Mr. Fish in this journal in its issue of May, 1926. (See page 316.)

It may be briefly summarized as follows:—The cork was heated in a rotating cage, or rumbler, over a row of gas burners, submitting it to a temperature of at least 100 deg. C. (212 deg. F.) for 40 minutes, the temperature of the hot air at the exit being 210 deg. C. (410 deg. F.). During the last five minutes, sulphur in powder was rumbled with the hot cork at the rate of 1 lb. to 50 lb. of cork.

Marks B, D, and F were packed with this specially treated cork. That these cases arrived in better condition is shown by the slightly higher prices they fetched at auction. The whole consignment having been landed in excellent condition, the superiority of the cases packed with treated cork is much less marked than it would otherwise have been; in a less favorable season it would no doubt have been much more evident.

Dr. Butler's Investigation.—Arrangements were made for four cases (A33, B36, C42, and D46) to be delivered to Dr. Butler, Director of Mycology, Kew Green, Surrey, for examination. Extracts from his report are given in Mr. Fish's article in this issue (see pages 34-5).

Sulphuring the Grapes.—As pointed out in a previous article (February, 1926), grapes imported in 1925 from Almeria (Spain) showed signs of having been sulphured before packing. Whether this was for oidium control or to prevent mould development in transit was not clear, but the point seemed of sufficient importance to justify investigation. Hence the grapes in cases marked C, D, and F were lightly dusted with flowers of sulphur before packing, whilst the contents of cases A, B, and E were not so treated.

As will be seen from the London reports, and particularly that of Dr. Butler, sulphuring seems to have served no useful purpose; it would indeed seem to be responsible for slight deterioration. From

* It is not easy to adjust the ratio of cork to fruit: this depends on several factors, but mainly on the size of the granulations; finer samples of cork weigh heavier, bulk for bulk. With coarser grades it is not possible to get as much of the filler in amongst the grapes.

the report on Almeria conditions (page 30), it would appear that the sulphur noticed on the Spanish grapes was applied for oidium control.

Reports and Account Sales.—The following extracts speak for themselves. Though the prices realized are low, especially in view of the excellent condition of the grapes, it must be remembered that the *Moreton Bay* reached London just at the close of the general strike. They were sold on a much depressed market. Under normal conditions they should have sold for fully 50 per cent. more.

EXTRACT FROM REPORT OF MR. F. WHITE, ACTING TRADE COMMISSIONER TO THE AGENT-GENERAL FOR VICTORIA, DATED 2ND JUNE, 1926.

"I have pleasure in informing you that these grapes arrived in excellent condition, and there was no difference to be seen upon examination between the sulphured and unsulphured grapes and the treated cork and untreated cork.

They were carried at an extremely even temperature, as follows:—

	Port chamber. Degress Fahr.	Starboard chamber. Degrees Fahr.
Leaving Melbourne ..	.. 38	.. 39
The following day ..	.. 34	.. 35
Leaving Adelaide ..	.. 33	.. 34
Leaving Fremantle ..	.. 34	.. 34
Leaving Colombo ..	.. 33	.. 33
Leaving Port Said ..	.. 33	.. 33
Leaving Southampton ..	.. 33	.. 34
Leaving Hull	.. 33	.. 33
Arriving London ..	.. 33	.. 33

There were one or two cases of grapes rather dull in colour, and some bunches had some small berries which should have been cut out, but, taken as a whole, it was a great success, and a credit to all concerned.

I attach prices realized for these grapes at to-day's sale.

I have also this day delivered personally to Dr. Butler the four cases* for special examination.

EXTRACT FROM LETTER OF MR. E. A. EVA, GENERAL MANAGER FOR UNITED KINGDOM OF AUSTRALIAN COMMONWEALTH LINE OF STEAMERS, DATED 3RD JUNE, 1926.

T.S.S. "MORETON BAY," EXPERIMENTAL CHAMBER SHIPMENT OF GRAPES.

On receipt of your traffic letter No. 106, of the 16th April, we got into touch with Mr. White, of the Victorian Office, in order to make a special examination of the Ohanez grapes, which were being carried under experimental conditions.

Although this vessel arrived at Southampton on the 21st May, she had to call at Hull, and was not ready to discharge cargo in London until the 31st May. We therefore gave Mr. White the opportunity of examining the fruit, or even discharging some at Hull. He did not, however, care to avail himself of this offer, as he made all arrangements for London discharge.

The experimental chamber was opened on the 1st June, and the fruit discharged was immediately loaded on to vans for carriage to the market.

One case was opened on board the vessel, and showed the fruit in practically perfect condition. The grapes appeared, if anything, to be on the green side.

The cases were opened in the market that evening, and with the exception of four cases sent to Kew for experimental purposes, they were sold the following morning. Seventy-eight ¾-bushel cases averaged 15s. 6d. per case, and 34 bushel cases averaged 18s. per case.

It appears, as is indicated from the cutting which you forwarded to us, that the cases were not all treated alike, but various methods of sterilizing cork packing, &c., were adopted. We have to report that all the cases were in good condition, irrespective of treatment. This, no doubt, is largely contributed to by the care with which the shipment has been treated, but at the same time the new form of case adopted, and the coarse form of granulated cork used, are no doubt contributing factors.

* In order that the cases subjected to different treatment should be comparable it was arranged to send Dr. Butler four cases grown and packed by the same grower. These cases were A 33, B 36, C 42, and D 46; they were grown and packed by Mr. Constable, of Merbein.

The temperatures were very evenly maintained, and our opinion of the good conditions of carriage is enforced by the appearance of pears in the adjoining chamber, practically all of which were discharged in good condition, despite the fact that there were several soft varieties among them.

ACCOUNT SALES BY M. ISAACS & SONS LTD., OF 113 CASES GRAPES EX "MORETON BAY," BY ORDER AND FOR ACCOUNT OF TRADE COMMISSIONER FOR THE GOVERNMENT OF VICTORIA, AUSTRALIA, FORWARDED BY THE AGENT-GENERAL FOR VICTORIA ON 17TH JUNE, 1926.

FLAT BOXES (¾ BUSHEL).

1926.			s. d.	£ s. d.	£ s. d.
June 2—					
A	2	16 0		1 12 0	
	1	..	..	0 15 0	
	3	14 0	..	2 2 0	
B	12	15 6	..	9 6 0	
	12	16 0	..	9 12 0	
	7	16 6	..	5 15 6	
	4	19 0	..	3 16 0	
	1	..	..	0 17 0	
C	2	14 6	..	1 9 0	
	3	15 0	..	2 5 0	
D	5	14 6		3 12 6	
	6	17 0	..	5 2 0	
	6	16 0	..	4 16 0	
	7	14 0	..	4 18 0	
	3	16 0	..	2 8 0	
	1	..	..	0 15 0	
					59 1 0

BOXES (BUSHEL).

E	5	21 0	..	5 5 0	
	8	22 0	..	8 16 0	
	2	22 0	..	2 4 0	
F	5	19 0	..	4 15 0	
	7	19 6	..	6 16 6	
	5	17 6	..	4 7 6	
	2	20 0	..	2 0 0	
DO ..	4	..	..	..	
					34 4 0
	113				93 5 0
Messrs. M. Isaacs and Sons charges on—					
113 packages				7 10 8	
Brokerage and guarantee				1 17 4	
					9 8 0
					83 17 0

EXTRACT FROM MR. WHITE'S FINAL REPORT TO THE AGENT-GENERAL FOR VICTORIA ON THE "MORETON BAY" SHIPMENT, DATED 28TH JUNE, 1926.

Referring to my reports of the 3rd and 17th June, on the experimental shipment of 113 cases of grapes ex the above boat, I now give the final report on this shipment.

I examined the following cases with a representative of Messrs. M. Isaacs and Sons Limited:—

A.—Grapes not sulphured; untreated cork; ¾-bushel cases.

A. 31.—37 lb., medium berry and bunch, good colour, good stalk.

33.—34 lb. medium berry and bunch, good colour, green stalk, immature.

107.—40 lb., small berry, medium bunch, good colour, good stalk, mature.

B.—Grapes, not sulphured; treated cork; ¾-bushel cases.

B. 10.—40 lb., small berry and bunch, good colour and stalk, mature.
34.—38 lb., medium berry and bunch, good colour and stalk, mature.
37.—39 lb., medium berry and bunch, fair colour and stalk, tired.
80.—37 lb., good berry, medium bunch, good colour and stalk, mature.
85.—37 lb., medium good berry, good bunch, good colour, and stalk, mature.
86.—38 lb., good berry, medium bunch, good colour and stalk, mature.
87.—37 lb., small medium berry, medium bunch, fair colour and stalk.
115.—34 lb., good berry and bunch, green colour, green stalks, immature.

C.—Grapes sulphured; untreated cork; ¾-bushel cases.

C. 41.—40 lb., medium berry and bunch, green colour, good stalks, immature.
118.—35 lb., medium berry and bunch, fair colour, good stalks, little immature.

D.—Grapes sulphured; treated cork; ¾-bushel cases.

D. 28.—36 lb., mixed berry, some very small, medium bunch, fair, good colour, more careful selection needed.
47.—38 lb., medium good berry, good bunch, fairly good colour, good stalk.
76.—40 lb., medium berry and bunch, good colour and stalk, very good.
122.—34 lb., good berry, medium bunch, dull colour, good stalk, slightly defective.

E.—Grapes not sulphured; untreated cork; bushel cases.

E. 21.—Good berry, medium bunch, good colour, good stalk.
24.—Good berry, medium bunch, good colour, good stalk.
51.—Good berry, medium bunch, good colour, good stalk.
61.—Good berry, medium bunch, good colour, good stalk.
127.—Good berry, medium bunch, green stalk, immature.

F.—Grapes sulphured; treated cork; bushel cases.

F. 26.—Medium berry and bunch, good stalk, ripe.
130. Medium good berry, medium bunch, green stalk, immature.

Of the 24 cases we examined, I could see no difference between the sulphured and unsulphured. They appeared all in good condition, the cork falling away when bunches were lifted from the cases, and I should say there was very little change in the grapes from the time they left Melbourne and their arrival here.

Great care was taken with stowage, and plenty of dunnage used so that the air could circulate round the cases, carrying away any moisture caused by refrigeration. A steady temperature of 33 deg. Fahr. greatly helped to make this consignment a success.

I prefer the bushel cases, as they hold the cork better and make a more attractive package, and bunches are not so likely to be crushed as in the flat boxes. The cardboard buffers round the edges of the cases were good, as they prevented the cases being packed too tightly against each other, thus stopping the circulation of air, which I think has been partly the cause of some of the past shipments of grapes arriving in bad condition.

Messrs. M. Isaacs & Sons Ltd., under date 4th June, report as follows:—

The Victorian grapes ex ss. *Moreton Bay* were sold on Wednesday, 2nd June.

"This consignment arrived in good condition, and upon inspecting with regard to the condition there was nothing to choose between the different lots, either those packed in cork, sulphur treated, roasted or ordinary. For a means of experiment it was quite a failure. It shows, however, that when fruit is carefully packed, and sufficient attention is given to the growing, it is quite possible to market Victorian grapes in England during May and June, when they are wanted.

The quality was good, the fruit being very similar to that of Almeria, although the bunches and berries could be, with advantage, larger.

We carefully inspected various cases taken indiscriminately from the bulk, and when we discovered that there was no difference, it was useless to open the whole.

Container.—This fruit was packed in granulated cork, in an attractive case, bushel and three-quarter bushel size. There were round cardboard buffers round the edges to allow the air to pass between the cases when stowed. These card-

board buffers, we think, are a very good plan, and allow the fruit to be kept at an even temperature throughout the voyage, as air is easily circulated round the cases. In our opinion, the smaller cases are to be preferred, and this is borne out in the price realized.

There was a good demand for this fruit, and we have since seen the buyers, who inform us that the fruit turned out very satisfactorily. We might add that the price would have been higher had the quantity been greater. As it was, the important buyers were not interested. The weight of the packages varied considerably, the three-quarter bushel cases being from 34-40 lb,. as you will see from the weights we give of the cases that were shown." (See above.)

Extracts from the report of Dr. E. J. Butler, Director of the Imperial Bureau of Mycology at Kew, on the four cases submitted to him, will be found on pages 34-35.

EXTRACT FROM FURTHER LETTER FROM MR. E. A. EVA, GENERAL MANAGER FOR UNITED KINGDOM OF THE AUSTRALIAN COMMONWEALTH LINE, TO THE BRANCH MANAGER, MELBOURNE, DATED 14TH JULY, 1926.

The ss. Moreton Bay—Experimental Chamber Shipment of Grapes.

Further to our letter of 3rd June, we have now seen the reports forwarded by the Victorian Office to Melbourne. Both Mr. White, of the Victorian Office, and M. Isaacs & Sons, the salesmen, were impressed with the good condition of the fruit.

From an experimental point of view, however, the result is negative, inasmuch as all four varieties of packing landed in good condition.

These varieties were, you will recollect, grapes treated with sulphur, ordinary cork packing, grapes treated with sulphur, sterilized cork packing, grapes without treatment, sterilized cork packing, grapes and cork packing without treatment. Both Mr. White and the salesmen were impressed with the cardboard buffers which had been fixed to the cases in order to leave an air space between each case in stowage.

As we used dunnage, these buffers were of no advantage while the fruit was on board, and we notice that there was a tendency for them to become knocked off during handling.

The salesmen state with regard to sale that even better results would have been obtained had they had a larger quantity to handle. As it was, they could not interest the most important buyers.

Mr. Butler, for the Cambridge Laboratories, reports that he found traces of parasitic fungi in each variety of packing. The growth was not excessive in any case, and had not affected the fruit, being mainly confined to the stalks with the possible exception of a solitary decayed berry here and there. So far as he could tell, the sulphur treatment did not prevent the growth of these fungi; in fact, the grapes without treatment had carried, if anything, a little better.

On the other hand, it was noted that the treatment of the cork appeared to be of advantage, as, being dryer, it was less inclined to adhere to the fruit; in fact, it appeared to shake free quite easily.

You will understand from our reference above to fungi that these were only traces, and did not in any way affect the value or condition of the fruit.

Shipments to New Zealand.

Three lots of grapes were sent by the Department of Agriculture to the Dunedin Exhibition. These were all shipped per s.s. *Manuka* on three different trips made by this steamer, leaving Melbourne respectively on 3rd March, 20th March, and 8th April. The voyage to Dunedin, via the Bluff, is of only five days' duration.

With the exception of four cases of the final consignment (8th April), the grapes were all packed in the usual ¾-bushel grape case with granulated cork filler, in the same way as the bulk of the *Moreton Bay* shipment. The cork was an ordinary trade sample; it was not subjected to any special treatment. On each voyage, space was made available in the cool chamber with the ship's stores.

Shipment of 3rd March, 1926.

At this date the only ripe grapes available were of the Muscat Gordo Blanco variety. Though the unsuitability of this variety for lengthy storage is well known, it was hoped that the short voyage of only five days' duration would not prove too severe a test, especially if the grapes were packed with cork filler. Muscat grapes would certainly be in request if their condition were at all satisfactory. Only eight cases were sent, the grapes being supplied by a Merbein grower.

It is to be regretted that this sort proved unsuitable, even for so short a voyage. These eight cases were reported on as follows by Mr. W. L. Smallhorn, Australian Commissioner, at the Dunedin Exhibition (22nd March, 1926):—

"I am very sorry to report that the shipment of grapes was not a success. It was impossible to get a complete bunch out of a case. The stems of the grapes were very dry and perished looking, and would not hold the berries when held up. The fruit was in a very ripe condition, and the bunches contained quite a lot of over-ripe berries, which dampened the fine cork dust, and it was difficult to remove the dust from the fruit.

As I was unable to get presentable bunches for display purposes, I forwarded the seven cases to Mr. T. Sagar, fruiterer, to open up and dispose of. I was present when the goods were opened, and I should say that he would be lucky to get five or six lb. of anything like decent bunches from each case. Mr. Sagar offered me 5s. per case, which I accepted, as I considered it very reasonable in view of the condition of the fruit.

Mr. Sagar informed me that he had not seen a good shipment arrive in Dunedin from Australia during the past ten years, and said that if he could get them in anything like good condition, there was a very good market here. He suggested that a small shipment might be made of two or three-quarter cases, containing not more than 12 lb. These should be packed, he thought, in larger cork grains, and one case could be sent with only the fruit therein.

If you are sending any more of the white type of muscatel grape for display on the exhibit, I would suggest that they be sent slightly on the green side."

Shipment of 20th March, 1926.

By this time, though Ohanez were not yet ripe enough to send, Waltham Cross, or Rosaki (to give the variety its correct name), were available. Ten cases of this sort were shipped, packed as previously. Though not landed at their destination in really good condition, this sort stood the voyage much better than the Gordo Blanco grapes previously sent. Mr. Smallhorn reported on this shipment as follows (21st April, 1926):—

"With reference to your letter of 19th March regarding the shipment of ten cases of Waltham Cross grapes, I have to inform you that six of the cases were used for display purposes on the stand, and attracted a considerable amount of attention.

The shipment was very much better than the first lot of Gordo Blanco grapes. After very careful handling, I was able to display about 70 per cent. of bunches from each case. About 30 per cent. of the fruit dropped off the bunches during the process of shipment and removal from the cases. I distributed a few samples to press men and representative people, and they were well pleased with the flavour.

In order to see how the fruit would sell in the market, I sent four cases to Paterson & Co., fruit merchants. They were sold by auction as follows:—2 cases at 17s. 9d., 1 at 16s. 9d., and 1 at 14s. 3d."

Shipment of 8th April, 1926.

Ohanez grapes being now available, the final shipment was limited to this sort of well proved keeping quality. In view of the short

duration of the voyage it was thought that this grape might be landed in good condition if packed in the ordinary bushel case, without cork filler, in which local grapes are marketed in Melbourne. Four cases were thus packed, the remaining sixteen being packed in the export ¾-bushel case with cork filler. These last reached Dunedin in excellent order, whilst those packed without filler were unsatisfactory, as will be seen from Mr. Smallhorn's report of 19th April, 1926:—

"In continuation of previous correspondence regarding the shipment of grapes to the Exhibition, I have to inform you that the sixteen cases of Ohanez grapes, packed in cork, arrived in excellent condition. The four cases which were sent without packing were not so satisfactory, and I think that we can drop this idea of shipment.

I was very busy during the last week, and was unable to give much time to making display on the stand. I therefore arranged for a well-known Dunedin fruiterer to sell the grapes alongside the Victorian exhibit, and I received £21 17s. for the twenty cases. I was advised by other Dunedin fruiterers that other Ohanez grapes forwarded through a merchant arrived in splendid order, and sold in the market at 21s. and 22s. per case. The leading fruiterer in Dunedin says that there is a good future for such shipments as these grapes."

From the above it will be seen that the prospects of successful grape shipment to New Zealand are encouraging, though the fact must not be lost sight of that on entering the Dominion our grapes pay duty at the rate of 1d. per lb. (net weight of grapes). Only grapes of proved carrying quality such as Ohanez, Emperor, and perhaps Purple Cornichon, and a few others should be shipped, and these seem to need packing with cork filler as for export to London. It is probable that the wood wool and paper wrapper system of packing such as is successfully used by South African grape shippers to London (see page 26) may prove suitable for the short voyage to New Zealand.

From correspondence received by the Department of Markets and Migration from the New Zealand Trade Commissioner in January and February, 1926, it would appear that the prospects in New Zealand were excellent for Australian grapes arriving in good condition. In view of the fact that Californian fresh grapes are successfully sold in the market during the season, there should be no difficulty in landing Victorian grapes in good condition.* It was also pointed out that the conservative uses of irrigation waters, more especially after the grapes have set on the vines, and the confining of export to varieties which will stand some handling, are factors which have gone a long way towards making the Californian shipments possible.

Storage Experiments at Government Cool Stores.

Three lots of grapes may be here mentioned: (1) grapes from Mr. Williams, of Merbein; (2) grapes from Mr. Parker, of Shepparton; (3) grapes from Rutherglen Viticultural Station. These grapes were packed in the usual ¾-bushel case with granulated cork, and stored at a uniform temperature of 33 deg. F. in a chamber refrigerated by the dry air system (not direct expansion). The Merbein and Shepparton grapes were similar to those shipped by the same growers per *Moreton Bay.*

* In October, 1925, a shipment of 50 barrels of Emperor grapes, grown at Fresno, California, was sold in Sydney for 35s. per barrel of 30 lb. net. These were packed with coarse red sawdust filler; they arrived in excellent condition; there was no waste. Similar shipments of Emperor and Malaga grapes from California were sold in Melbourne last October for 25s. per barrel. Emperors arrived in very good order. Malagas (identical with our Valency) were less satisfactory.

GRAPES FROM MR. WILLIAMS, MERBEIN.

These comprised fourteen cases as follows (the reference letters being the same as for the *Moreton Bay* shipment:—

Mark A.—Nos. 1, 2 and 3. Grapes not sulphured—untreated cork.
Mark B.—Nos. 4, 5 and 6. Grapes not sulphured—treated cork.
Mark C.—Nos. 7, 8 and 9. Grapes sulphured—untreated cork.
Mark D.—Nos. 10, 11 and 12. Grapes sulphured—treated cork.
No. 13. Picked after rain, grapes sulphured—untreated cork.
No. 14. Picked after rain, grapes not sulphured—untreated cork.

Cases 1 to 12 were picked on 13th April, packed the following day, and consigned to cool store on 14th April, i.e., a week later than the *Moreton Bay* shipment.

Cases 13 and 14 were forwarded on 18th May. They received an irrigation and an inch of rain about a week before being packed. The object of sending them was to test the opinion held by some Merbein growers that recently watered grapes keep longest, a contention altogether disproved by this trial.

Cases 1, 4, 7, and 10 were examined on 9th June, when they were in very good order, there being but little difference between them. On 29th July they were still in fair order, with few damaged berries. The main defect was adherence of grains of cork to the stalks, which disfigured them a good deal. At this date, though the differences were but slight, they could be classed as follows:—First, B; second, D; third, C; fourth, A.

On 29th July cases 13 and 14 were in very poor condition, and altogether inferior to Nos. 1 to 12, which had been cool stored for over a month longer. No. 14 was in rather worse order than No. 13.

Cases 1 to 12 were again inspected on 6th September, when they were still in fair condition, with but little difference between the different lots. Each had some discoloured and mouldy berries which had to be trimmed out before the grapes could be displayed at the Royal Agricultural Show (16th September). It is noteworthy that though the *Moreton Bay* grapes reached London in such excellent order, similar grapes, retained in cool storage in Melbourne, provided a much less satisfactory show display than in several previous years.

GRAPES FROM MR. PARKER, SHEPPARTON.

Six cases were cool stored as follows:—

No. 1.—Purple Cornichon; untreated cork; grapes not sulphured.
No. 2.—Purple Cornichon; treated cork; grapes not sulphured.
No. 3.—Purple Cornichon; treated cork; grapes sulphured.
No. 4.—Ohanez; untreated cork; grapes not sulphured.
No. 5.—Ohanez; treated cork, grapes not sulphured.
No. 6.—Ohanez; treated cork; grapes sulphured.

These grapes were to have been forwarded immediately after the *Moreton Bay* lot, but repeated heavy rains necessitated postponement. It was not till after a good south wind had dried them, that they were ultimately picked, packed, and forwarded to Melbourne on 7th May, i.e., a month later than the grapes for the *Moreton Bay* shipment. These grapes had stood a good deal of rain before being picked and packed. Mr. Parker estimates that 8½ inches fell between 20th March and the date on which they were picked. Cases 1 to 3 were

inspected on 27th July. There was little difference between them. No. 3 was slightly the best, and No. 1 the worst (wastage barely 1 per cent.). The grapes had suffered little deterioration, and there were no nests of fungous infection, but they were too tender to handle with confidence. The conditions were too severe for Purple Cornichon, which is only a moderate "carrier." Cases 4 to 6 were inspected on 29th July, when they were in very good order; there was but little to choose between the three; No. 5 was best, No. 4 was second, and No. 6 was third. Here again, sulphuring seemed to play no useful part.

It is curious that the Shepparton grapes, though exposed to the weather for a month longer, during which much rain fell,* were in better condition than the Merbein grapes. It is true that they had undergone a month less cool storage.

GRAPES FROM RUTHERGLEN VITICULTURAL STATION.

Four different grape sorts were tested, viz., Ohanez; Emperor, the large oval red grape so largely grown in California; Purple Cornichon and Gianetti. The last named is a handsome, large, slightly oval, red grape, imported from Sardinia some years ago.

Three lots of each of these were stored, each lot being subjected to separate treatment as follows:—

A. *Control.*—Packed with cork filler in the usual way. The filler used was an ordinary trade sample not subjected to any special treatment.

B.—*Sulphured* on the vine (dusted) before picking; an additional puff of sulphur being applied when packing. Grapes packed with cork filler.

C.—*Fumigated* with SO_2. No special fumigating appliances being available, these grapes were exposed for an hour and a half in the bottom of a closed cask of 500 gallons capacity in the upper part of which 12 oz. of sulpuhur was burnt after closing the manhole. This quantity burnt almost entirely. These grapes were also packed in cork filler.

These grapes went into cool store on 31st March. They were examined on 26th May and again on 29th July.

On 26th May the following notes were made, the points being awarded for soundness on the basis of a maximum of 10 points:—

Gianetti A (control), 8 points.
Gianetti B (sulphured), 7½ points.
Gianetti C (fumigated), 7 points.

This is a rather poor keeper; though the flesh is firm, giving the impression that it should keep well, the skin is thin and liable to damage in handling. This sort has stored better than in some previous experiments; the wastage differed little in the three lots; it was in the neighbourhood of 3 per cent. damaged berries. The SO_2 treatment renders the fruit less attractive for table purposes, though it seems to have positive effect in preventing mould development. (See below.)

Emperor.—These were all in excellent condition, and worth about 9 points. It was not possible to discriminate as regards soundness;

* During this period, at the Viticultural Station, Rutherglen, 4.33 inches were recorded and a slight frost occurred on 17th April. This was in addition to 2.27 inches in March. At Shepparton the rainfall was even heavier.

the wastage was less than 1 per cent. If anything B (sulphured) were most attractive. The fumigated grapes were less so, especially to the palate, though almost entirely sound.

Emperor is a fine shipping grape, though not equal to Ohanez in this respect. It has, in our experiments, proved much superior to all other sorts (except Ohanez) that have been tested. The adherence to the pedicel and the strength of the dry, wiry stalks are remarkable.

Purple Cornichon.—Awarded 9 points. These were in much the same condition as last, though the stalks were not so dry; wastage less than 1 per cent. The berries adhere fairly well for this sort, the chief defect of which is their tendency to drop. If anything, C seemed to adhere rather better than the other two, though flavour had suffered somewhat.

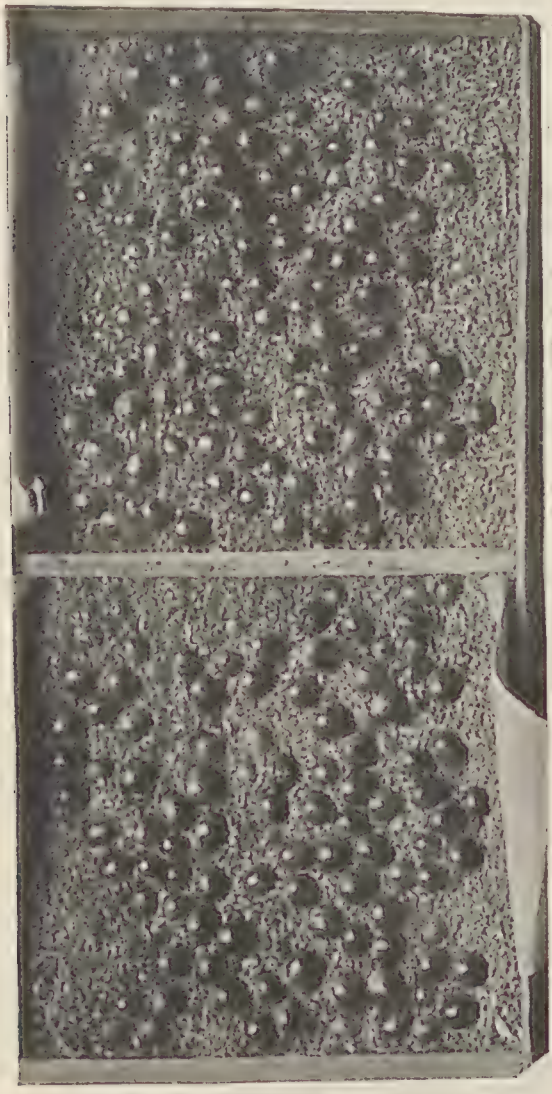
[Photo kindly supplied by Geo. Munro & Coy., London.

Fig. I.—Grapes from South Africa wrapped in Paper and packed in Wood-wool.

Ohanez.—These were in excellent order; in fact, almost perfect. Their condition was so good that detailed examination was postponed until 29th July. At this date they were still in very fair order. The control case (A) was the best, though the sulphured case (B) was nearly equal to it. The fumigated case (C) was not in such good condition as the other two; the deteriorating influence of SO_2 on flavour and texture was noticeable; the stalks also seemed slightly more brittle.

Action of Sulphur Dioxide.—In the article previously referred to (February, 1926) allusion was made to Californian reports on the value of SO_2 for prolonging the keeping period of juice grapes shipped

from California to other parts of the United States of America. It was stated that "50 mgr. of SO_2 per kilo of grapes is sufficient, approximately, to double the keeping period, and that 100 mgr. does not injure the colour, texture, and flavour of the grapes."



[Photo kindly supplied by Geo. Munro & Coy., London.

Grapes from Western Australia packed with Granulated Cork Filler.

This may be true in the case of "juice grapes" destined for conversion into wine, but for table purposes, and applied as outlined above, the effect of sulphur dioxide fumigation is marked, and of undesirable nature.

Appearance is not much altered, except that red grapes are rendered slightly darker in colour. The SO_2 would appear to advance maturity slightly. This was most noticeable with Gianetti, and to a lesser extent with Emperor and Purple Cornichon. It is contrary to what might be expected of a bleaching agent such as SO_2.

White grapes seem to be rendered somewhat dull—they look dead and less turgid than untreated ones.

On texture, and especially on flavour, the action of SO_2 was even more marked. When tasted, the fumigated grapes have a peculiar flabby, dead texture. They are distinctly less crisp than those not so treated. They have, in addition, a curious vinous flavour, difficult to define, as though there had been a trace of fermentation; a strange result, in view of the action of SO_2 as an anti-ferment.

The fumigated grapes seem to be slightly wetter, from exuding juice, after long storage, but on the other hand mould development certainly seems to be hindered to some extent.

Recent Information from Almeria (Spain).

Thanks to inquiries made by the Agent-General for Victoria, the following information concerning the climate of Almeria, and the irrigation methods followed, has been made available. A series of questions was sent to the Agent-General. These, together with the answers received, were as follows:—

Question I.—Information as to rainfall. The average annual rainfall at Almeria and, if possible, the monthly averages?

Answer.—The average rainfall for the five years 1921 to 1925 was 205 milimetres (8.07 inches). For monthly averages, see Meteorological Observations at Almeria for the year 1925 (page 29).

Question II.—Are certain years practically rainless, and what is the effect of such on the grape shipping industry?

Answer.—Yes; but it only affects the land that has no water supply of its own. (See observations at foot with regard to available water for irrigation.)

Question III.—Is irrigation regularly practised?

Answer.—Yes.

Question IV.—How many waterings are given, and what are the approximate dates of such waterings?

Answer.—Usually four or five irrigations during the year until July or August, the dates varying according to the district.

Question V.—Quantity of water applied at the different waterings in cubic metres per hectare?

Answer.—Approximately 900 to 1,000 cubic metres per hectare.

(*Note*).—3.5 to 3.9 inches. This obviously refers to the quantity of water applied at each irrigation (F.C.)

Question VI.—What period elapses between the last watering and the picking of the grapes?

Answer.—According to the altitude of the vine, varying from one to three months. (See observations referred to.)

METEOROLOGICAL OBSERVATIONS AT ALMERIA (SPAIN) FOR THE YEAR 1925.

Month. 1925.	Averages.				Temperature Oscillation. Daily Minimum.	Extreme Temperatures.		Sky Clear.	Clouded.	Dew.	Mean Evaporation in Millimetres.	Rainfall in Millimetres.	Relative Humidity.	Dominant Winds.	
	Atmospheric Pressure at 0° 70′.	Temperature of Air in the Shade. (Centigrade.)	Temperature in Shade.			Maximum.	Minimum.	Days.						Direction.	Force Millimetres per Second.
			Maximum.	Minimum.											
January	767.6	11.9	15.9	7.9	8.0	17.5	5.8	14	2	7	2.4	1.1	70	N.	2.4
February	758.8	12.4	16.3	8.4	7.9	21.3	5.8	9	2	2	3.1	23.0	68	S.W.	2.4
March ..	755.5	11.7	15.4	8.1	7.3	18.4	5.5	7	10	1	3.5	41.9	61	N.	4.6
April ..	756.3	16.1	20.8	11.7	8.9	25.2	7.9	12	3	3	4.0	1.4	62	S.W.	2.4
May ..	755.1	18.2	23.0	13.4	9.6	27.4	11.1	17	1	5	4.5	0.1	60	S.W.	4.6
June ..	755.1	22.0	26.5	17.4	9.1	33.6	14.3	10	3	1	4.0	8.9	70	S.W.	2.4
July ..	756.2	23.4	28.4	18.4	10.0	34.0	15.0	21	3	1	4.3	1.0	68	S.W.	2.4
August ..	756.9	26.2	31.0	21.4	9.6	39.6	17.8	23	2	1	4.0	0.0	66	S.W.	2.4
September	756.9	23.5	27.3	19.6	7.7	32.7	15.1	12	1	1	3.7	0.0	67	S.W.	2.4
October	756.9	19.6	23.3	16.0	7.3	26.6	12.3	7	8	0	2.0	28.7	72	S.W.	2.4
November	755.1	14.4	17.9	11.0	6.9	23.4	7.6	2	11	2	1.9	74.6	70	N.	2.4
December	759.6	13.6	16.8	10.4	6.4	21.0	4.2	2	18	3	1.3	60.3	67	N.	2.4

Milimetres—40.20.
Inches—9.44.

Question VII.—The time that elapses between the gathering of the grapes and their being packed for shipment?

Answer.—As early as possible after ripening, shipment being now by turn after fruit reaches the quay. Shipments from middle of August to middle of December.

Question VIII.—Are the vines sulphured shortly before being picked?

Answer.—The vine is sulphured three or four times during the development of vegetation, the last sulphuring being simultaneous with the last watering.

Observations.—(Question 2). By far the greater part of the vines are irrigated with water derived from the Andarax River, and also from springs, and in many cases from shafts, the water being drawn by motor power. In such cases the lack of rain does not prejudice the vine. Excess water (rain) only then is prejudicial, but only when the grape is ripe.

A shortage of rain, when no other water is available, produces a small grape which does not keep long.

(Question 6).—The vines are grown at altitudes ranging from 100 to 3,000 feet, and it follows that some grapes are much later than others. They are picked between the middle of August, when shipments commence, until November, shipments only ceasing in December. Grapes shipped in August would be last irrigated in July, and those shipped from September till December are last irrigated in August, when usually the last watering takes place.

A South African Method of Packing.

Regular shipments have been made to London from the Cape for some years past of grapes packed in an altogether different manner from the Almeria method. The bunches are wrapped in paper and packed with wood-wool. The method will be understood on reference to Fig. 1 (page 26), for which illustration I am indebted to Mr. D. B. Adam, who recently brought it from London. Fig. 2 shows Western Australian grapes packed with cork filler.

Space will permit but the briefest reference to this interesting style of packing, which seems to give satisfactory results in South Africa. Two different kinds of paper are used for wrapping, viz., sulphited paper and waterproof paper. Both seem suitable.

It must be remembered that the voyage from the Cape to London is of much shorter duration than that from Melbourne. For lengthy storage it is difficult to imagine any medium giving better results than the cork filler so successfully applied to the Spanish grapes of Almeria.*

Nevertheless, the South African system merits trial. It should prove altogether suitable for short voyages such as that to New Zealand. It is hoped to conduct experiments with this style of packing, both for shipment and for cool storage in Melbourne, during the coming grape season.

* Experiments conducted at the Government Cool Stores, some years back, with packing similar to this, were rather unsatisfactory; the grapes did not keep so well as similar sorts packed with cork filler. Possibly the wrapping paper and wood-wool then obtainable were not of the most suitable type.

GRAPE EXPORT PROBLEM.

By Stanislaus Fish, B. Agr. Sc., Assistant Plant Pathologist.

During the past few years experiments have from time to time been made in the export to England and elsewhere of fresh grapes. While some of these shipments have been landed in a good condition, success cannot be looked for with the degree of certainty necessary for the establishment of a regular export trade.

The markets abroad are such as would allow the development of the export trade of Ohanez grapes, for it is possible to get this variety on the English market in May and June, just at the time when grapes are required. Besides the English market, avenues of trade exist elsewhere. In New Zealand and the East there exists a demand for such grapes.

The reports received from other countries at which shipments arrived in an unsatisfactory condition stated that the grapes opened up in a wasty condition, but little evidence could be obtained as to the causes of such deterioration.

With a view to analysing the relative importance of the many factors involved in the satisfactory export of Ohanez grapes, an investigation into the problem has been initiated.

Previous experiments by Mr. F. de Castella, Government Viticulturist, have proved that the Ohanez grape is the best shipping variety. Further, it has been demonstrated that such grapes packed in granulated cork carry better than where no cork packing is used.

This year's work in connexion with the export problem has taken the form of a preliminary examination of wasty grapes, sources of contamination of the grapes by moulds capable of causing wastage, together with some observations on the conditions affecting the keeping quality of grapes. This work is by no means exhaustive, but serves more to introduce one to the problem and hence enable extensive experiments to be designed for the coming grape season.

Fungi Associated with Wasty Grapes.

Many specimens of wasty grapes direct from the vineyard and from cool storage were examined during last season at the Science Branch, and the following fungi were determined from the berries and stalks:—

Present on berry—

Grey mould ..	.. *Botrytis cinerea*, Pers.
"Pinhead" mould	.. *Rhizopus nigricans*, Ehr.
Green mould	.. *Penicillium*, Sp.
Black moulds	.. *Alternaria vitis*, Cav. *Aspergillus niger*, Van Tiegh.

On the stalk—

Cladosporium herbarum (Pers.) Lk.

Botrytis cinerea, Penicillium, and *Rhizopus nigricans* were the predominant fungi usually found, whereas *Alternaria vitis,* and *Aspergillus niger* were present to a far less extent, particularly the *Aspergillus niger.*

Botrytis cinerea fungus, commonly called grey mould, infects the berries, causing the green colour of the skins to give way to a reddish-brown coloration (see plate 1). After a time little black dots (the

resistant wintering stage of the fungus) are produced on the surface of the brown skin. These little dots are very resistant to weather conditions, and can carry the fungus over winter, and are then capable of producing new growths of the mould when conditions are favorable.

"Pinhead" mould (*Rhizopus nigricans*) has been found attacking berries under cool-storage conditions.

Green mould (*Penicillium*, Sp.) attacks the berries after *Botrytis* (grey mould) has damaged them (see plate 2).

Plate 1.—Ohanez Grapes attacked by the fungus *Botrytis cinerea*, Pers.

Note the sclerotes (wintering form of the fungus) as small black dots on the berries (indicated by arrows).

The green Ohanez grapes attacked by *Botrytis cinerea* turn reddish-brown in colour.

Black moulds (*Alternaria* and *Aspergillus*) occurred very occasionally on wasty grapes examined in last year's experiments. The white fungus strands of the mould (*Cladosporium herbarum*), which grows on the stems and entangles the cork (see plate 5), was present in a variable extent on bunches of grapes examined.

Inoculation experiments carried out with grey mould (*Botrytis cinerea*), "pinhead" mould (*Rhizopus nigricans*), and green moulds (*Penicillium*, Sp.), showed that these three forms were capable of causing damage to grapes wherever they gained entrance through a wound (see May, 1926, issue of this *Journal*).

Previous to the trial shipments the cork filler was found to be infested with the spores of grey mould, pinhead mould, and green

mould. Hence, to remove this source of contamination, the cork packing for the 1926 trial shipments was treated as described in the article published in this *Journal* for May last (pp. 316-8). In a rotating cage the cork was heated by hot air to a sufficient temperature to kill the spores or seeds of any of the three fungi named, and at the end of the process sulphur was rumbled with the cork (1 lb. sulphur to 50 lb. cork).

Plate 2.—Bunch of Ohanez Grapes from Cool Storage, showing green Normal Berries together with Berries attacked by *Botrytis cinerea* and *Penicillium*, Sp. (Green Mould).

Trial Shipment, 1926.

In April last, a trial shipment of 113 cases of Ohanez were sent to England. Some of the grapes were sulphured before picking, and again before packing. The treatment of the various lots into which the shipment was divided was as follows:—

(A) Grapes not sulphured; untreated cork packing (five ¾-bushel cases).

(B) Grapes not sulphured; cork packing treated (37 ¾-bushel cases).

(C) Grapes sulphured; untreated cork packing (six ¾-bushel cases).

(D) Grapes sulphured; cork packing treated (29 ¾-bushel cases).

(E) Grapes not sulphured; untreated cork packing (sixteen cases —1-bushel cases).

(F) Grapes sulphured; treated cork packing (eighteen 1-bushel cases).

(Two cases were not marked owing to error of grower.)

Dr. E. J. Butler, Director of the Imperial Bureau of Mycology, kindly consented to examine for fungi one case from each of the four lots of ¾-bushel cases. These four cases were from the same vineyard at Merbein, and were packed by the grower.

The following extracts are taken from Dr. Butler's report:—

Received four cases of grapes, marked respectively A33, B36, C42, D46, ex s.s. *Moreton Bay*. Some bunches from each box were examined during next few days, others being hung in the laboratory to test keeping qualities. The grapes arrived in excellent condition, with decidedly less than 1 per cent. wastage in any box.

On examining individual grapes and stalks from a considerable number of bunches, both directly and after incubation in a moist chamber, the following fungi were determined:—

A33.—Fruit not sulphured; packed in untreated cork:—
Botrytis cinerea fairly frequent, one nest of small size in one bunch.
Cladosporium herbarum fairly frequent, common on the stalks.
Rhizopus nigricans, a little.
Penicillium, Sp., a little.

B36.—Fruit not sulphured; packed in treated cork:—
Cladosporium herbarum on the stems and also from the interior of a fruit commencing to rot. "Hormodendron" form very frequent.
Penicillium, a little.
Alternaria, Sp., from inside a rotted fruit.

C42.—Fruit sulphured; packed in untreated cork:—
Cladosporium herbarum, practically pure in all the many stalks examined.
Penicillium, Sp., a little.
Dematium pullulans (isolated from one rotting fruit).

D46.—Fruit sulphured; packed in treated and sulphured cork:—
Cladosporium herbarum frequent, growing even along sulphur particles.
Penicillium, Sp., insignificant.
Alternaria, Sp., insignificant.

In quantity, *Cladosporium herbarum* far surpassed all the others taken together. It was evidently capable of making a fairly extensive, though stunted, growth in cold storage, and of fructifying copiously.

It was practically universal on the stalks. I do not think it injured the fruit, though able to penetrate into wounded grapes. *Botrytis*, which was certainly present in A33, had failed to grow, except for a small close growth in one bunch.

Penicillium and *Alternaria* were present in small quantities here and there, and developed on incubating wounded fruit. I do not think they rotted any of the originally sound fruit.

In A33 the pieces of cork were frequently bound to the stems of the bunches by a growth of mycelium, so that on shaking the bunch a good deal of the cork within the bunch remained behind.

In B36 this was not the case, as it appeared to the touch that the cork packing was drier (no doubt as the result of heating) than in A33. It appeared that heating the cork had a certain effect in preserving the bunches free from adhering cork, but sulphuring had not this effect.

On hanging the bunches, no further appreciable fungus growth took place in twenty days, by which time the individual grapes in all the bunches had

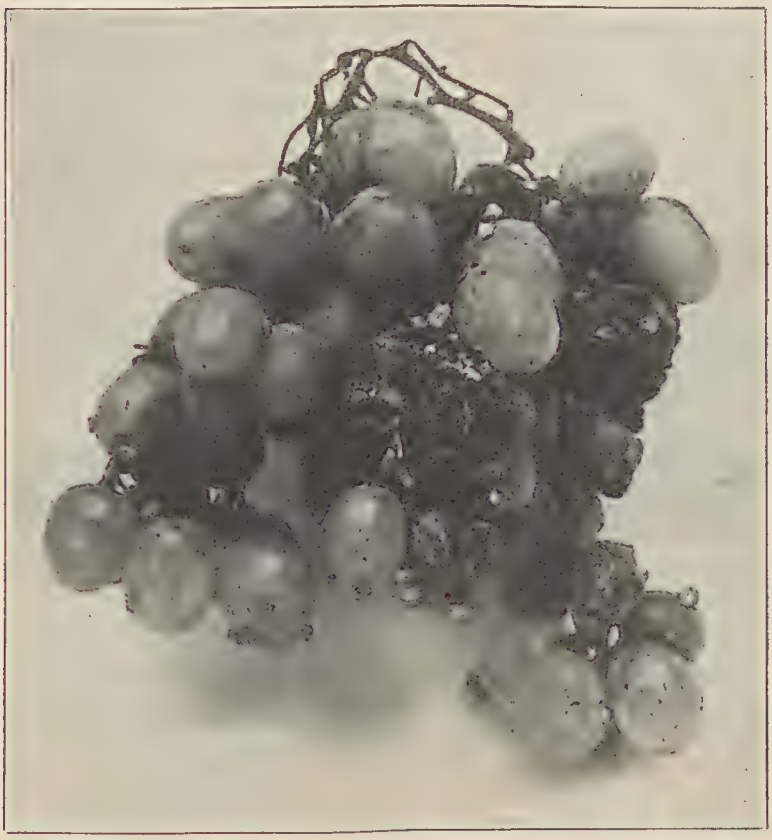


Plate 3.—Bunch of Ohanez Grapes from Cool Storage showing Normal Berries together with berries attacked by *Botrytis cinerea*.

began to shrivel, but quite a fair number were still turgid. This hanging brought out what was already slightly evident on opening the boxes, namely, that the untreated box A33 was in somewhat better general condition than those containing sulphur. The grapes in A33 were looking better and slightly better ripened than in the other boxes. On hanging, the latter got stained and spotted on the skin more than in the bunches from A33.

Dr. Butler's report goes on to ask "whether it would be possible to include a few treated cases with each shipment until a wasty shipment arrives? These cases could be marketed in the ordinary way until

the wasty one comes, and then the treated cases and an untreated (from the same grower and packer) for comparison could be submitted to us for examination. It would also be a help, from time to time, to receive specimens of damaged bunches from a wasty box."

This trial shipment was landed in England in good condition. There was not a great difference between any lots. The weather conditions at Merbein for the first three months of 1926 would possibly account for this lack of difference. The rainfall recorded there for these months was—January, nil; February, nil; March, 53 points.

These grapes were pre-cooled to a temperature of 33° F. before shipment, and, according to the report of the Acting Trade Commissioner, they were carried at 33-34° F., this temperature being obtained the day after leaving Melbourne, and maintained evenly throughout the voyage.

The check cases kept back from the trial shipment, and held in the Melbourne Cool Stores, showed that the sulphur appeared to have no effect on the development of mould; further, the sulphured grapes were somewhat depreciated in value, having a particular flavour and an unattractive appearance.

Unfortunately, the shipment was offered for sale in England just at the time of the general strike there. All the same, the prices realized were profitable; but it goes without saying they would have been much more so under favorable marketing conditions. The average prices obtained for the ¾-bushel cases were—

	s.	*d.*
A.—Grapes not sulphured and untreated cork ..	14	10
B.—Grapes not sulphured and treated cork	16	3½
C.—Grapes sulphured and treated cork	15	4¾
D.—Grapes sulphured and untreated cork	14	9½

From this it can be seen that the best prices were obtained with the grapes not sulphured and packed in treated cork.

Conditions Affecting the Keeping Quality of Grapes.

As the result of observations made during last year, it is thought that the following considerations are worthy of note:—

1. *Weather Conditions at Vineyard.*—The exact relation between the weather conditions during the growth of Ohanez grapes and the keeping quality of the grapes has not yet been worked out, but it appears to have an important bearing on the success of shipments.

In 1923, 640 cases from thirteen different Merbein growers were shipped to England per s.s. *Orvieto.* These sold well; the price varied from 13s. to 28s. per case. The rainfall at Merbein during the latter portion of that season was as follows:—In February, three rains totalling 26 points; no rain fell in March.

In 1924, 11,000 cases of Ohanez grapes were shipped to London, and 4,000 cases to New Zealand and the East. The results were disastrous. The rainfall for February and March of that season was as follows:—In February, 228 points fell in seven falls, and in March 85 points in four falls.

In 1925, 10,000 cases were shipped to London, and 2,000 cases to New Zealand and the East. These all arrived in an unsatisfactory state. The rainfall in January, 1925, was 88 points in six falls; February, 34 points in three falls; and in March, 47 points in four falls.

Under particular weather conditions, i.e., wet conditions in February and March, common fungi develop on the vines. *Botrytis cinerea*, Pers., has been seen in Victoria on the berries in February, and on the vines up till Easter. It covers the berries with a greyish-brown mycelium coating, which may extend to the whole bunch and cause a mass of rot. If grapes for export have been contaminated with the spores of the fungi, and have not been

Plate 4.—Ohanez Grapes from Cool Storage showing a Typical Nest, i.e., a Mass of Mouldy Berries and Cork cemented together by the Fungus Strands.

picked carefully, then failure may result. Fungus spores are light, and experiments in packing sheds have shown that they were present in the atmosphere to a variable extent.

2. *Packing Shed Conditions.*—Spores from mouldy grapes permitted to remain in the packing shed will blow about on to the grapes and granulated cork, and this infection may cause damage in a shipment, particularly if such grapes have been carelessly handled.

3. *Granulated Cork Packing.*—The third source of infection is from the cork filler; the details of the laboratory work on the cork material were published in this *Journal* for May, 1926. It was stated there that many samples of granulated cork examined were heavily infested with the spores of fungi (*Botrytis, Rhizopus, Penicillium*).

4. *Picking and Packing.*—Ohanez grapes should be picked and packed with the utmost care, so as to prevent injury to the berries, for it is obvious that if damaged grapes, contaminated with spores of fungi, are packed in a medium containing spores (that is, untreated granulated cork), nothing but failure can result.

Picking should take place during the afternoon of a dry day, for the grapes then being dry would not be so liable to damage at the junction of the pedicel and the berry. This point was demonstrated in laboratory experiments by F. J. de Villiers (*Science Bulletin* 45, South Africa).

Plate 5.—Bunch of Ohanez Grapes from Cool Storage showing how Granulated Cork is held together by the Strands of the Fungus *Cladosporium herbarum*, Pers. Lk.

Where grapes are packed wet, it was noticed that a white mycelium of the fungus *Cladosporium herbarum* developed along the stalk, entangling granulated cork and causing it to adhere, to the grave detriment of the appearance of the fruit when unpacked in England. It was observed in the check cases kept back from the 1926 trial shipment that, where Ohanez grapes were packed in treated cork (average moisture-content 7.36 per cent.) and untreated cork (average moisture-content 8.78 per cent.), and held in the Melbourne Cool Stores, the growth of the white mycelium along the stems, with the consequent cork entangling, was more marked in the untreated cork cases.

Conclusion.

While it is too early in the investigations for one to make any recommendations to the grower, yet at the present time it appears that the following points are worthy of consideration:—

1. Keep the vineyard as clean as possible. In order to help in this, pick and burn all mouldy bunches, and do not allow mouldy grapes to lie around.
2. The packing shed should be kept clean. All mouldy grapes should be burnt, and the shed sprayed out with 1 lb. of copper sulphate to 5 gallons of water.
3. Dirty granulated cork should not be used, as it has been demonstrated that this is a source of infection.
4. Grapes should be handled very carefully, so as to minimize mechanical injury.
5. Grapes should be picked when dry.
6. Bunches should be allowed to dry off in a well-ventilated room for at least 24 hours before packing.
7. The results of the trial shipment in 1926 show that pre-cooled grapes may be carried without damage at a temperature of 33° to 34° F. kept even.

THE CURRANT MOTH

(*Trochilium tipuliformis,* Clerck).

By H. W. Davey, Chief Orchard Supervisor.

Currant moths (*Trochilium tipuliformis,* Clerck) having been seen in suburban gardens on the 11th October, 1926, and again on the 9th November, it behoves all growers of bush fruits to be very vigilant so that measures may be taken to stamp out this most serious pest before it becomes established.

It is not yet known whether the moths have spread beyond the metropolitan gardens. Inspectors of the Orchard Supervision Branch have been directed to carefully inspect the bush fruits in their districts with a view to determining the extent to which the pest has spread; and, if found, to take the necessary action for its control. Its presence at Buninyong is suspected.

Currant moths are especially destructive to currant bushes. They also attack both the gooseberry and raspberry, and, if they become plentiful, will in all probability extend their operations to loganberries.

The perfect insect emerges early in November, and immediately afterwards pairs; the female later deposits her eggs, each of these being placed separately in a crevice of the bark, or where a stub occurs from pruning.

The young caterpillar, on hatching, eats its way into the stem, proceeding either up or down, but always eating out the pith, which may be destroyed for a length of 10 inches, causing the limb so attacked to die. In fact, such is the destructive nature of these insects that a large currant bush may be practically ruined in one season.

The caterpillar, on becoming full-grown, pupates in the hollow tube it has formed in the stem, emerging as a moth the following spring.

This insect is native to Europe, but has already established itself in New Zealand, Tasmania, and other countries, but was unrecorded from the mainland of Australia until October of this year, when larvae, and later, pupae and perfect insects, were discovered by the writer in several Melbourne private gardens.

It is always a difficult matter to deal with insects whose larvae are concealed feeders, for spraying is of little or no value as a control. The better method is to exercise extra vigilance at pruning time, so that any branches showing signs of weakness, and limbs having the typical hollowed-out stems, may be cut right out and burnt, together with the contained insects. If all shoots suspected of harbouring these insects be thus treated, there should be no great difficulty in controlling them on their first appearance in the orchard.

Description.

Larva.—The caterpillar is about half an inch long, yellowish white in colour, with a faint dark line along the back; a few hairs scattered over the body; brown head; the usual three pairs of thoracic legs, abdominal feet, and terminal claspers—although the latter appear to be but feebly developed.

Pupa.—This is dark coloured, and almost black just before emergence of the moth. The chrysalids of these insects are remarkable inasmuch as the appendages are not so firmly encased or soldered to the body as in most other lepidopterous insects.

Imago.—The perfect insects are elegant little creatures about half an inch long by three-quarters of an inch across the wings, and both from coloration and shape have rather a wasp-like appearance. The body is of a blue-black colour, crossed with three bright yellow bands, the tip of the abdomen being furnished with a large tuft of scales which gives it a brush-like appearance. The thorax has a longitudinal stripe of yellow on each side, and the legs also are faintly barred with the same colour. The wings are for the most part hyaline, hence the name of "Clearwings" given to this group of insects.

Classification.

This insect belongs to the family *Sesiidae* or *Aegeriidae* (Clearwings), but is known under several generic names, although the specific name remains unaltered. These are as follow:—*Sesia tipuliformis*, *Aegeria tipuliformis*, and *Trochilium tipuliformis* (Clerck), the latter name being the one it now goes by.

ARTIFICIAL FERTILIZERS REGISTERED FOR 1927

(as required by the Fertilizers Act 1915).

The Artificial Fertilizers Act imposes certain obligations on the manufacturer and importer of artificial fertilizers. Among the most important are—(*a*) registration of brands; (*b*) supplying invoice certificates on sale of a brand of fertilizer; and (*c*) labelling of every package.

What is a Fertilizer.

The definition under the Act is any material containing nitrogen, phosphoric acid, or potash, which has been manufactured, prepared, or produced in any manner for the purpose of fertilizing the soil or supplying nutriment to the plant, but does not include farm-yard or stable manure, or any crude night soil, crude offal, or other unmanufactured refuse.

Registration of Brands.

All manufacturers or importers of fertilizers who intend offering for sale any such material as above defined, shall, on or before the first day of November in each year, make an application to the Director of Agriculture for the registration of a brand for each of such fertilizers. All applications must set forth on the prescribed form the name and place of business of the applicant, the brand to be associated with the fertilizer, and analysis of the fertilizer, stating the percentage of each fertilizing ingredient, and the respective form in which they occur, and the retail price per ton of the fertilizer at headquarters.

Invoice Certificate.

If not at time of sale, then before delivery of any fertilizer, the vendor shall give the purchaser an invoice certificate in the form prescribed by the Act, stating the name of the seller, the name of the buyer, the weight purchased, the name and brand of the fertilizer, and the percentage of nitrogen, phosphoric acid, and potash, and the forms in which they occur in the fertilizer. It is essential that the purchaser should not only obtain but keep the invoice certificate covering each lot of fertilizer purchased, it being the seller's guarantee of the fertilizer sold, and in the case of any dispute as to quality the production of the invoice certificate is essential.

Labelling.

Every parcel of fertilizer sold should have a plainly printed label securely affixed to such parcel, showing clearly and truly the name of manufacturer, the registered brand, the analysis stating the percentage of nitrogen, phosphoric acid, and potash, in the respective forms in which they occur in the fertilizer, and the nett weight of the fertilizer in the parcel.

Unit Values.

The unit value is the value of 1 per cent. of nitrogen, phosphoric acid, or potash in one ton of fertilizer.

The unit value may serve a useful purpose if put into application. The value of any brand can be calculated only on the fertilizer constituents guaranteed by the vendor. To apply the unit values, the buyer must first ascertain what the seller guarantees, and by multiplying the percentage of the ingredient by the unit value given in table for the form in which it is present, he will be able to arrive at its commercial value.

By way of illustration the following examples are given:—

Blood and Bone Fertilizer.

Guaranteed to contain—									
Nitrogen as blood and bone									5.47%
Phosphoric acid, citrate soluble									5.44%
Phosphoric acid, citrate, insoluble									8.10%
Phosphoric acid, total									13.54%
Nitrogen as blood and bone, unit value									£1 2 6
Phosphoric acid as citrate soluble, unit value									0 5 6
Phosphoric acid as citrate insoluble, unit value									0 5 0
Nitrogen			5.47%	x	£1	2	6	=	6 3 1
Phosphoric acid			5.44%	x	0	5	6	=	1 9 11
Phosphoric acid			8.10%	x	0	5	0	=	2 0 6
Value per ton									£9 18 6

Bonedust.

Guaranteed to contain——									
Nitrogen as bone									3.73%
Phosphoric acid									19.50%
Mechanical condition—									
Fine bone									38.50%
Coarse bone									61.50%
The nitrogen as fine bone			3.73%	x	38.50			=	1.43%
The nitrogen as coarse bone			3.73%	x	61.50			=	2.30%
The phosphoric acid as fine bone			19.50%	x	38.50			=	7.50%
The phosphoric acid as coarse bone			19.50%	x	61.50			=	12.00%
Nitrogen as fine bone, unit value									£1 2 6
Nitrogen as coarse bone, unit value									1 1 0
Phosphoric acid as fine bone, unit value									0 5 6
Phosphoric acid as coarse bone, unit value									0 5 0

Percentage of Constituent x Unit Value.

Nitrogen as fine bone		1.43	x	£1	2	6	=	£1 12 2
Nitrogen as coarse bone		2.30	x	1	1	0	=	2 8 4
Phosphoric acid as fine bone		7.50	x	0	5	6	=	2 1 3
Phosphoric acid as coarse bone		12.00	x	0	5	0	=	3 0 0
Value per ton								£9 1 9

Fertilizers Act 1915.

LIST OF UNIT VALUES FOR THE YEAR 1927.

		£	s.	d.
Nitrogen, as Blood	per unit	1	2	6
„ as Nitrate—	„	1	1	4
„ as Blood and Bone	„	1	2	6
„ as Bone and Flesh	„			
„ as Fine Bone	„			
„ as Coarse Bone	„	1	1	0
„ as Ammonia	„	0	16	6
Phosphoric Acid—				
as *Water Soluble*	„	0	5	0
as *Citrate Soluble*—				
in Blood and Bone	„	0	5	6
in Bone and Super	„			
in Super and Bone	„			
in No. 3 Complete Manures	„			
in Market Garden Manures	„			
as Fine Bone	„			
in other Fertilizers	„	0	5	0
as *Citrate Insoluble*—				
in Blood and Bone	„	0	5	0
in Bone and Super	„			
in Super and Bone	„			
in No. 3 Complete Manures	„			
in Market Garden Manures	„			
as Coarse Bone	„			
in Basic Phosphate	„	0	2	9
in Ground Phosphate	„			
in Super and Phosphate	„			
in Potash and Phosphate	„			
in Ammonia and Phosphate	„			
in other Complete and Mixed Manures	„			
in Superphosphate	„	0	1	0
in Nitro-super	„			
Potash as Sulphate	„	0	6	0
„ as Chloride	„	0	4	10

P. RANKIN SCOTT,
Chemist for Agriculture.

Melbourne, 3rd December, 1926.

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927.

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Mainly Nitrogenous.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Nitrate of Soda ..	Cresco	15·00	..	..	..	..	15·00	..	..	..	..	..	16 0 0	Cresco Fertilizers Ltd., North Geelong
,, ,, ..	Federal, S.N. ..	15·50	..	..	..	..	15·50	..	..	..	..	..	16 0 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Mt. Lyell, M.L. in diamond	15·50	..	..	..	..	15·50	..	..	..	..	..	16 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ...	Sickle	15·50	..	..	..	..	15·50	..	..	..	..	..	16 0 0	Cuming, Smith, and Co. Ltd. Pty. 65 William-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	15·50	..	..	..	..	15·50	..	..	..	..	..	16 0 0	Wischer and Co. Pty. Ltd., 489 Little Collins-street, Melbourne
Sulphate of Ammonia ..	Cresco	..	20·00	..	..	..	20·00	..	..	..	..	..	17 10 0	Cresco Fertilizers Ltd., North Geelong
,, ,, ..	Federal, A.S. ..	..	20·00	..	..	..	20·00	..	..	..	..	..	16 10 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ...	M.G. Co. in diamond ..	..	20·59	..	..	..	20·59	..	..	..	..	..	16 0 0	Metropolitan Gas Co., Flinders-street, Melbourne
,, ,, ..	Mt. Lyell, M.L. in diamond	..	20·00	..	..	..	20·00	..	..	..	..	..	16 10 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Sickle	..	20·00	..	..	..	20·00	..	..	..	..	..	16 10 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	..	20·00	..	..	..	20·00	..	..	..	..	..	16 10 0	Wischer and Co. Pty. Ltd., 489 Little Collins-street, Melbourne
Blood Manure	Cockbill's	..	..	8·50	..	..	8·50	..	..	..	1·00	..	8 10 0	J. Cockbill, 407 Post Office-place, Melbourne
,, ,, ...	Federal	..	..	7·50	..	..	7·50	..	..	..	..	..	9 5 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ...	M.C.C. in diamond ..	..	..	7·75	..	..	7·75	..	..	..	1·25	·60	7 15 0	City Abattoirs, Smithfield, Kensington
,, ,, ...	Mt. Lyell, M.L. in diamond	..	..	7·50	..	..	7·50	..	..	..	..	..	9 5 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ...	Sickle	..	..	7·50	..	..	7·50	..	..	..	..	..	9 5 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.			Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Fresh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.		£	s.	d.	
Mainly Nitrogenous—continued.		%	%	%	%	%	%	%	%	%	%	%				
Blood Manure	Wischer and Co. Pty. Ltd.	..	..	7·50	..	..	7·50	..	..	..	..	..	9	5	0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
,, ,, ...	Nifex	..	..	7·50	..	..	7·50	..	..	..	1·00	·25	13	0	0	H. C. Pannifex and Co., 26 Market-street, Melbourne
Dried Blood	Imperial in diamond	..	..	11·75	..	..	11·75	..	..	..	·75	·50	12	0	0	W. Angliss and Co. Pty. Ltd., 42 Bourke-street, Melbourne
Castor Meal	Alba	..	..	..	..	..	..	..	..	..	..	2·00	5	10	0	Lycett Pty. Ltd., Normanby-road, Montague.
Mainly Phosphatic. Readily Soluble.																
Superphosphate ..	Cresco, 24.. ..	..	..	..	..	..	..	22·00	·50	1·50	24·00	..	5	13	6	Cresco Fertilizers Ltd., North Geelong
,, ..	Federal, 24% ..	..	..	..	..	..	..	22·00	·50	1·50	24·00	..	5	13	6	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ..	Mt. Lyell, 24%, M.L. in diamond	..	..	..	..	..	..	22·00	·50	1·50	24·00	..	5	13	6	Mt. Lyell Mining and Railway Co. Ltd., 381 Collins-street, Melbourne
,, ..	Sickle, Florida, 24% ..	..	..	..	..	..	..	22·00	·50	1·50	24·00	..	5	13	6	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ..	Wischer and Co. Pty. Ltd., 24%	..	..	..	..	..	..	22·00	·50	1·50	24·00	..	5	13	6	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
,, ..	Cockbill's, 22 ..	..	..	..	..	..	..	20·50	·50	1·50	22·00	..	5	0	0	J. Cockbill, 407 Post Office-place, Melbourne
,, ..	Cresco, 22	..	..	..	..	..	..	20·50	·50	1·50	22·00	..	5	7	6	Cresco Fertilizers Ltd., North Geelong
,, ..	Federal, 22 per cent. ..	..	..	..	..	..	..	20·50	·50	1·50	22·00	..	5	7	6	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ..	Mt. Lyell, 22 per cent., M.L. in diamond	..	..	..	..	..	..	20·50	·50	1·50	22·00	..	5	7	6	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ..	Sickle, Florida, 22 per cent.	..	..	..	..	..	..	20·50	·50	1·50	22·00	..	5	7	6	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ..	Wischer and Co. Pty. Ltd., 22 per cent.	..	..	..	..	..	..	20·50	·50	1·50	22·00	..	5	7	6	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Mainly Phosphatic—continued. *Moderately Soluble.*		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Super and Phosphate ..	Cresco, 30 phosphate	..	..	..	..	..	..	10·00	1·50	19·50	31·00	..	5 10 0	Cresco Fertilizers Ltd., North Geelong
,, ,, ..	Federal Super and Phosphate, 30 per cent.	..	..	..	..	..	..	10·25	1·50	19·25	31·00	..	5 10 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Mt. Lyell Super and Phosphate, 30 per cent., M.L. in diamond	..	..	..	..	..	..	10·25	1·50	19·25	31·00	..	5 10 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Sickle Super and Phosphate, 30 per cent.	..	..	..	..	..	..	10·00	1·50	19·50	31·00	..	5 10 0	Cuming, Smith, and Co. Pty Ltd. 65 William-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd., Super and Phosphate, 30 per cent.	..	..	..	..	..	..	10·25	1·50	19·25	31·00	..	5 10 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
Super and Phosphatic Guano	Cresco	..	..	..	..	..	..	10·30	3·45	6·65	20·40	..	5 5 0	Cresco Fertilizers Ltd., North Geelong
Basic Phosphate ..	Federal	..	..	..	..	..	..	..	14·00	3·00	17·00	..	5 7 6	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Mt. Lyell (M.L. in diamond)	..	..	..	..	..	..	..	14·00	3·00	17·00	..	5 7 6	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Sickle	..	..	..	..	..	..	..	14·00	3·00	17·00	..	5 7 6	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	..	..	..	..	..	..	..	14·00	3·00	17·00	..	5 7 6	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
Slowly Soluble. Ground Phosphate ..	Cresco, 80 per cent. ..	..	..	..	..	..	..	..	..	36·65	36·65	..	5 0 0	Cresco Fertilizers Ltd., North Geelong
,, ,, ..	Federal, 80 per cent.	..	..	..	..	..	..	..	..	36·65	36·65	..	5 0 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Mt. Lyell (M.L. in diamond) 80 per cent.	..	..	..	..	..	..	..	..	36·65	36·65	..	5 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Mainly Phosphatic—Slowly Soluble—continued.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Ground Phosphate ..	Mt. Lyell (M.L. in diamond) 60 per cent.	..	..	..	..	..	..	..	..	27·43	27·43	..	4 7 6	The Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Sickle, 80 per cent. ..	..	..	..	..	..	..	..	..	36·65	36·65	..	5 0 0	Cuming, Smith, and Co.Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd., 80 per cent.	..	..	..	..	..	..	..	..	36·65	36·65	..	5 0 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
,, ,, ..	Victoria Phosphate, No. 3 (unroasted and coarsely ground)	..	..	..	..	..	..	..	..	14·00	14·00	..	2 16 0	Phosphate Co-operative Co. of Australia Ltd., 440 Little Collins-street, Melbourne
,, ,,	Victoria Phosphate, No. 4 (unroasted and coarsely ground)	..	..	..	..	..	..	..	..	11·00	11·00	..	2 5 0	,, ,, ,,
,, ,, ..	Victoria Phosphate (roasted and intensely ground)	..	..	..	..	..	..	..	3·00	12·00	15·00	..	4 8 6	,, ,, ,,
Phosphatic Guano ..	Cresco	..	..	..	..	..	..	..	6·85	13·40	20·25	..	5 0 0	Cresco Fertilizers Ltd., North Geelong
Mainly Potassic. Readily Soluble.														
Muriate of Potash ..	Cresco	..	..	..	..	..	..	..	..	..	..	50·00	12 0 0	Cresco Fertilizers Ltd., North Geelong
,, ,, ..	D and Co.	..	..	..	..	..	..	..	..	..	..	50·00	12 0 0	Dalgety and Co. Ltd., 461 Bourke-street, Melbourne
,, ,, ..	Federal	..	..	..	..	..	..	..	..	..	..	50·00	12 0 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Mt. Lyell, M.L. in diamond	..	..	..	..	..	..	..	..	..	..	50·00	12 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Sickle	..	..	..	..	..	..	..	..	..	..	50·00	12 0 0	Cuming, Smith, and Co.Pty. Ltd 65 William-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	..	..	..	..	..	..	..	..	..	..	50·00	12 0 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Mainly Potassic—Readily Soluble—continued.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Sulphate of Potash ..	Cresco	..	..	..	..	..	..	..	..	..	..	48·5	14 10 0	Cresco Fertilizers Ltd., North Geelong
,, ,, ..	D and Co. ..	..	..	..	..	..	..	..	..	..	..	48·0	14 10 0	Dalgety and Co. Ltd., 461 Bourke-street, Melbourne
,, ,, ..	Federal	..	..	..	..	..	..	..	..	..	..	50·00	14 10 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Mt. Lyell, M.L. in diamond	..	..	..	..	..	..	..	..	..	..	50·00	14 10 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Sickle	..	..	..	..	..	..	..	..	..	..	50·00	14 10 0	Cuming, Smith, and Co.Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	..	..	..	..	..	..	..	..	..	..	50·00	14 10 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
Containing Nitrogen and Phosphoric Acid. Readily Soluble.														
Nitro-Super	Federal, N.S. ..	..	1·50	..	·50	..	2·00	15·37	·98	1·75	18·10	..	7 0 0	Nobell (Aus.) Ltd., 380 Collins-street, Melbourne
,, ...	Mt. Lyell, M.L. in diamond	..	1·50	..	·50	..	2·00	15·37	·98	1·75	18·10	..	7 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ...	Sickle	..	1·50	..	·50	..	2·00	15·37	·98	1·75	18·10	..	7 0 0	Cuming, Smith, and Co. Pty.Ltd., 65 William-street, Melbourne
,, ...	Wischer and Co. Pty. Ltd.	..	1·50	..	·50	..	2·00	15·37	·98	1·75	18·10	..	7 0 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
Moderately Soluble.														
Blood, Bone and Super ..	Cockbill's	..	..	..	2·50	..	2·50	11·18	2·00	5·00	18·18	..	7 5 0	J. Cockbill, 407 Post Office-place, Melbourne
,, ,,	Federal, B.B.S. ..	..	..	..	2·50	..	2·50	11·28	1·47	2·55	15·30	..	7 10 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Containing Nitrogen and Phosphoric Acid—Moderately Soluble—continued.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Blood, Bone, and Super..	Mt. Lyell, M.L. in diamond	..	..	..	2·50	..	2·50	11·28	1·47	2·55	15·30	..	7 10 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,,	Sickle	..	..	..	2·50	..	2·50	11·28	1·47	2·55	15·30	..	7 10 0	Cuming, Smith, and Co. Pty.Ltd., 65 William-street, Melbourne
,, ,,	Wischer and Co. Pty. Ltd.	..	..	..	2·50	..	2·50	11·28	1·47	2·55	15·30	..	7 10 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
Bone and Super ..	Bendigo, Rohs in circle	..	..	..	..	2·00	2·00	9·00	4·00	6·00	19·00	..	9 0 0	P. Rohs Pty. Ltd., Grassy Flat, Bendigo
.. .. ..	Cresco	..	..	..	..	2·00	2·00	9·50	3·90	3·00	16·40	..	7 15 0	Cresco Fertilizers Ltd., North Geelong
,, ,, ..	Federal, B.S., No. 1 ..	..	..	..	..	2·00	2·00	11·00	2·67	4·54	18·21	..	7 15 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Mt. Lyell, No. 1, M.L. in diamond	..	..	..	..	2·00	2·00	11·00	2·67	4·54	18·21	..	7 15 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Sickle, Mixed "A" ..	..	..	..	..	2·00	2·00	11·00	2·67	4·54	18·21	..	7 15 0	Cuming, Smith, and Co. Pty.Ltd., 65 William-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd., No. 1	..	..	..	..	2·00	2·00	11·00	2·67	4·54	18·21	..	7 15 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
Super and Bone ..	Federal, S.B. ..	..	..	..	..	1·00	1·00	15·76	1·58	2·77	20·11	..	6 15 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Mt. Lyell, No. 2, M.L. in diamond	..	..	..	..	1·00	1·00	15·76	1·58	2·77	20·11	..	6 15 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Sickle, Mixed "C" ..	..	..	..	..	1·00	1·00	15·76	1·58	2·77	20·11	..	6 15 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd., No. 2	..	..	..	..	1·00	1·00	15·76	1·58	2·77	20·11	..	6 15 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
,, ,, ..	Elsworth, ½ and ½ ..	..	..	..	..	1·50	1·50	9·0	2·50	5·0	16·50	..	7 0 0	Eureka Fertilizer Works, cr. York and Josephs streets, Ballarat

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Containing Nitrogen and Phosphoric Acid—continued. *Slowly Soluble.*		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Blood and Bone ..	Arc	..	..	..	6·00	..	6·00	..	5·00	7·00	12·00	..	10 0 0	H. C. Pannifex and Co., 26 Market-street, Melbourne
,, ,, ..	Bendigo, Rohs in circle	..	..	..	6·00	..	6·00	..	5·00	6·00	11·00	..	11 0 0	P. Rohs Pty. Ltd., Grassy Flat, Bendigo
,, ,, ..	Brooklyn, T.B. and S. in diamond	..	..	..	6·10	..	6·10	..	4·50	8·00	12·50	..	9 0 0	T. Borthwick and Sons (A'sia.) Ltd., 84 William-street, Melbourne
,, ,, ..	Cockbill's	..	..	..	5·50	..	5·50	..	4·00	10·00	14·00	..	10 0 0	J. Cockbill, 407 Post Office-place, Melbourne
,, ,, ..	Cresco	..	..	..	5·00	..	5·00	..	3·00	11·50	14·50	..	10 10 0	Cresco Fertilizers Ltd., North Geelong
,, ,, ..	D.B.C. in diamond ..	..	..	..	5·00	..	5·00	..	4·00	6·00	10·00	..	9 0 0	Gippsland Co-op. Bacon Curing Co. Ltd., Dandenong
,, ,, ..	Federal, B.B. ..	..	..	..	5·00	..	5·00	..	6·00	10·00	16·00	..	10 10 0	Nobel (A'sia.) Ltd., 380 Collins-street, Melbourne
,, ..	H.C.P.	..	..	..	5·00	..	5·00	..	4·75	5·25	10·00	..	8 15 0	H. C. Pannifex and Co., 26 Market-street, Melbourne
,, ,, ..	Imperial in diamond..	..	..	..	4·75	..	4·75	..	5·00	12·00	17·00	..	8 10 0	W. Angliss and Co. Pty. Ltd., 42 Bourke-street, Melbourne
,, ,, ..	King's	..	..	..	5·10	..	5·10	..	6·90	8·56	15·46	..	9 0 0	J. C. King and Sons Pty. Ltd., South Geelong
,, ,, ..	Lighthouse ..	..	..	..	5·30	..	5·30	..	4·50	9·00	13·50	..	8 0 0	T. Borthwick and Sons (A'sia.) Ltd., 84 William-street, Melbourne
,, ,, ..	Mt. Lyell, M.L. in diamond	..	..	..	5·00	..	5·00	..	6·00	10·00	16·00	..	10 10 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	P. and Co.'s, B. and B.	..	..	..	7·17	..	7·17	..	5·00	6·99	11·99	..	10 10 0	H. C. Pannifex and Co., 26 Market-street, Melbourne
,, ,, ..	Pannifex's, No. 1 ..	..	..	..	6·00	..	6·00	..	5·00	8·00	13·00	..	10 3 0	,, ,, ,,
,, ,, ..	Pannifex's, No. 2 ..	..	..	..	5·50	..	5·50	..	5·00	7·00	12·00	..	9 10 0	,, ,, ,,
,, ,, ..	Pannifex's, A Grade	..	..	..	5·00	..	5·00	..	5·00	11·50	16·50	..	9 10 0	,, ,, ,,
,, ,, ..	Pannifex's, No. 4 ..	..	..	..	5·50	..	5·50	..	5·00	10·00	15·00	..	9 7 6	,, ,, ,,
,, ,, ..	Pannifex's, B. and B.	..	..	..	7·65	..	7·65	..	5·00	7·15	12·15	..	11 0 0	,, ,, ,,

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Containing Nitrogen and Phosphoric Acid—Slowly Soluble—continued.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Blood and Bone ..	Pridham's	..	..	..	5·34	..	5·34	..	8·65	8·68	17·33	..	9 10 0	W. Pridham Pty. Ltd., Braybrook
,, ,, ..	Sickle	..	..	..	5·00	..	5·00	..	6·00	10·00	16·00	..	10 10 0	Cuming, Smith, and Co. Pty.Ltd., 65 William-street, Melbourne
,, ,, ..	W. and M. in circle ..	..	..	..	6·00	..	6·00	..	4·50	5·50	10·00	..	12 0 0	Western and Murray Co-op. Bacon and Meat Packing Co. 522 Flinders-lane, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd.	..	..	..	5·00	..	5·00	..	6·00	10·00	16·00	..	10 10 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
Bone Fertilizer ..	A.N.A. surprise ..	..	..	..	..	3·00	3·00	..	4·00	12·00	16·00	..	9 0 0	G. W. Pennell, Braybrook
,, ,, ..	Ark	..	..	..	..	3·50	3·50	..	3·98	12·90	16·88	..	7 0 0	Arthur Murphy, Ararat
,, ,, ..	Bailey Bros. ..	..	..	..	..	2·50	2·50	..	6·50	9·50	16·10	..	7 10 0	Bailey Bros., Mount Clear
,, ,, ..	Cockatoo	..	..	..	..	3·81	3·81	..	6·50	12·16	18·16	..	7 0 0	R. Fordham, Cressy-road, Camperdown
,, ,, ..	Cresco	..	..	..	..	3·00	3·00	..	5·30	11·00	16·30	..	9 5 0	Cresco Fertilizers Ltd., North Geelong
,, ,, ..	Echuca	..	..	..	..	4·25	4·25	..	8·25	8·50	16·75	..	9 0 0	W. G. Boyle, Goulburn-road, Echuca
,, ,, ..	Eclipse	..	..	..	..	4·42	4·42	..	5·88	8·46	14·34	..	8 0 0	T. A. Mills, Spec. Gully, Golden Square
,, ,, ..	Federal, B.F. ..	..	..	..	..	4·00	4·00	1·50	4·84	8·08	14·42	..	9 10 0	Nobel (A'sia.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Mt. Lyell, M.L. in diamond	..	..	..	..	4·00	4·00	1·50	4·84	8·08	14·42	..	9 10 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Pannifex's, No. 5 ..	..	..	..	..	4·16	4·16	..	4·50	13·00	17·50	..	9 7 6	H. C. Pannifex and Co., 26 Market-street, Melbourne
,, ,, ..	Sickle	..	..	..	..	4·00	4·00	1·50	4·84	8·08	14·42	..	9 10 0	Cuming, Smith, and Co. Pty.Ltd., 65 William-street, Melbourne
,, ,, ..	Union Jack ..	..	..	..	..	5·24	5·24	..	5·19	11·57	16·76	..	8 10 0	A. N. Dale, corner Warrigal and Centre roads, Bentleigh

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Containing Nitrogen and Phosphoric Acid—Slowly Soluble—continued.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Bone Fertilizer ..	Wischer and Co. Pty. Ltd.	..	..	..	..	4·00	4·00	1·50	4·84	8·08	14·42	..	9 10 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
,, ,, ..	Elsworth's	..	..	..	..	3·0	3·0	1·50	4·0	9·50	15·00	..	7 10 0	Eureka Fertilizer Works, cr. York and Josephs streets, Ballarat
,, ,, ..	Cockatoo	..	..	..	..	3·81	3·81	..	6·50	12·16	18·16	..	7 0 0	R. Fordham, Cressy-road, Camperdown
Mixed Fertilizers—Containing Nitrogen, Phosphoric Acid and Potash. Readily Soluble.														
Complete Manure ..	Federal, No. 1 ..	..	2·50	..	..	..	2·50	12·82	·31	·62	13·75	7·50	8 15 0	Nobel (A'sia.) Ltd., 380 Collins-street, Melbourne
,, ,, ..	Federal, No. 2 ..	..	1·00	1·00	..	..	2·00	12·30	·30	·60	13·20	5·00	7 15 0	,, ,, ,,
,, ,, ..	Federal, No. 3 ..	..	..	..	2·00	..	2·00	8·71	2·61	4·43	15·75	6·25	9 0 0	,, ,, ,,
,, ,, ..	Mt. Lyell, No. 1, M.L. in diamond	..	2·50	..	..	..	2·50	12·82	·31	·62	13·75	7·50	8 15 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	Mt. Lyell, No. 2, M.L. in diamond	..	1·00	1·00	..	..	2·00	12·30	·30	·60	13·20	5·00	7 15 0	,, ,, ,,
,, ,, ..	Mt. Lyell, No. 3, M.L. in diamond	..	..	..	2·00	..	2·00	8·71	2·61	4·43	15·75	6·25	9 0 0	,, ,, ,,
,, ,, ..	Sickle, No. 1 ..	..	2·50	..	..	..	2·50	12·82	·31	·62	13·75	7·50	8 15 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	Sickle, No. 2 ..	..	1·00	1·00	..	..	2·00	12·30	·30	·60	13·20	5·00	7 15 0	,, ,, ,,
,, ,, ..	Sickle, No. 3 ..	..	..	..	2.00	..	2·00	8·71	2·61	4·43	15·75	6·25	9 0 0	,, ,, ,,
,, ,, ..	Wischer and Co. Pty. Ltd., No. 1	..	2·50	..	..	..	2·50	12·82	·31	·62	13·75	7·50	8 15 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
,, ,, ..	Wischer and Co. Pty. Ltd., No. 2	..	1·00	1·00	..	..	2·00	12·30	·30	·60	13·20	5·00	7 15 0	,, ,,
,, ,, ..	Wischer and Co. Pty. Ltd., No. 3	..	..	..	2·00	..	2·00	8·71	2·61	4·43	15·75	6·25	9 0 0	,, ,, ,,

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Mixed Fertilizers—Containing Nitrogen, Phosphoric Acid, and Potash—Readily Soluble—continued.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Market Garden Manure ..	Victor Plant Food ..	..	2·10	..	..	1·40	3·50	11·00	·50	·50	12·00	3·00	25 0 0	Victor Plant Food and Gardening Co. Pty. Ltd., 136 Dandenong-road, Caulfield
,, ,, ,,	Federal, M.G. ..	..	1·50	..	1·56	..	3·06	11·15	1·47	2·55	15·17	2·50	8 10 0	Nobel (Aus.) Ltd., 380 Collins-street, Melbourne
,, ,, ,,	Mt. Lycli, M.L. in diamond	..	1·50	..	1·56	..	3·06	11·15	1·47	2·55	15·17	2·50	8 10 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ,,	Sickle	..	1·50	..	1·56	..	3·06	11·15	1·47	2·55	15·17	2·50	8 10 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ,,	Wischer and Co. Pty. Ltd.	..	1·50	..	1·56	..	3.06	11·15	1·47	2·55	15·17	2·50	8 10 0	Wischer and Co. Pty. Ltd., 499 Little Collins-street, Melbourne
Mixed Manure ..	Cresco	..	1·50	..	..	..	1·50	9·60	1·40	8·70	19·70	7·50	7 15 0	Cresco Fertilizers Ltd., North Geelong
Horticultural Manure ..	Sickle	..	3·00	..	..	..	3·00	10·78	·26	·53	11·57	10·00	9 15 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
Guano	Anglo-Continental ..	..	..	..	..	..	..	8·85	2·39	1·37	12·61	1·89	18 10 0	Gibbs, Bright, and Co., 34 Queen-street, Melbourne
Ammonia and Phosphate	Cresco	..	2·00	..	..	..	2·00	10·00	2·00	18·00	30·00	..	7 0 0	Cresco Fertilizers Ltd., North Geelong
Phosphate and Potash ..	Victoria Phosphate and Potash Sulphate	..	..	..	..	..	..	..	4·00	9·50	13·50	5·00	8 6 0	Phosphate Co-operative Co. of Australia Ltd., 440 Little Collins-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1927—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.	Phosphoric Acid.	Mechanical Condition.		Price asked per ton.	Where Obtainable.
				Fine Bone.	Coarse Bone.		
		%	%	%	%	£ s. d.	
Bonedust	Mount Clear ..	3·00	18·00	30·00	70·00	8 0 0	Bailey Bros., Mount Clear
,, ...	Bendigo, Rohs in circle	4·00	18·00	45·00	55·00	9 10 0	P. Rohs Pty. Ltd., Grassy Flat, Bendigo
,, ...	Eclipse	3·27	24·59	69·40	30·60	9 10 0	T. A. Mills, Spec. Gully, Golden Square
,, ...	Horseshoe ..	3·75	20·00	36·00	64·00	8 15 0	P. Fitzgerald and Sons, Warrigal-road, Bentleigh
,, ...	J. A. Dundas ..	4·42	21·15	35·00	65·00	9 10 0	J. A. Dundas, Dynon-road, Footscray
,, ...	King's ..	3·87	20·63	34·00	66·00	9 0 0	J. C. King and Sons Pty. Ltd., South Geelong
,, ...	Magic	3·00	18·00	45·00	55·00	7 15 0	George Gardiner and Co. Pty. Ltd., Marshall
,, ...	Nova	3·75	18·00	30·00	70·00	9 0 0	H. C. Pannifex and Co., 26 Market-street, Melbourne
,, ...	Ox	4·39	24·57	24·00	76·00	7 0 0	T. Brown, Hamilton
,, ...	Pannifex's	4·00	20·00	20·00	80·00	9 17 6	H. C. Pannifex and Co., 26 Market-street, Melbourne

Melbourne, 3rd December, 1926.

P. RANKIN SCOTT,
Chemist for Agriculture.

STALLION REGISTER 1926-27.

Under the "Horse Breeding Acts 1919-1925."

Part I.* (*continued*)—Registrations prior to 30th September, 1926.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
23	Mac	5	Pony ..	Fraser, W. ..	Watchem
51	Macedon Hero ..	A	Draught ..	Evans, B. ..	Woodfield
4	Mac's Fancy II. ..	A	,, ..	Jorgenson, A. C.	Katyil
300	Magician ..	A	,, ..	Adkins, T. ..	Korumburra
677	Magic Railway ..	A	Pony ..	Wilkin, Mrs. J. ..	278 Toorak-road, South Yarra
301	Major Again ..	A	Draught ..	Leeson, J. ..	Rupanyup
830	,, Albert ..	A	,, ..	Doherty, J. P. ..	Rochester
302	,, Dale ..	A	,, ..	Foster, J. ..	Boort East
378	,, Douglas ..	6	,, ..	Scott, J. W. ..	Dimboola
716	,, Lee ..	4	,, ..	Menzel, E. V. ..	Armytage
303	,, Ribbonwood	A	Light ..	Grabsch, F. W...	Horsham
829	,, Willie ..	5	Draught ..	Alexander, A. S.	Diapur
793	Mallee Chavalier	5	,, ..	Hammill, W. A.	Sale
70	,, Picture ..	4	Light ..	Rowney, F. C. ..	Turriff West
786	Malt Lawn ..	5	Thoro'bred	Christenson, W...	Traralgon
536	Maori Chief ..	A	Light ..	Caldow, J. ..	Winchelsea
891	,, Jack ..	A	Draught ..	Potter, A. ..	Naroghid
443	Marcellus II. ..	6	,, ..	Forrest Bros. ..	Orford, Port Fairy
304	March Along ..	6	,, ..	Carr, H. ..	Manangatang
29	Marchfield ..	5	,, ..	Skelly, J. ..	St. Arnaud
305	Marcus	A	Light ..	Reid, Miss B. ..	Blossom Park, Bundoora
189	,, Junior ..	A	,, ..	Blair Bros. ..	Lara
885	Maritimus ..	A	Draught ..	Opie, T. J. ..	59 Sackville-street, East Kew
445	Mark Hazel ..	6	Pony ..	Croucher, Geo. ..	Dederang
695	Markhope ..	A	Thoro'bred	Clarke, trustees of R. W. J.	Sunbury
442	Mark Twain ..	3	Draught ..	Wharton, H. ..	Manangatang
538	Marquis Bold ..	6	,, ..	Sutton, F. ..	Fenton's Creek
16	,, Derby ..	A	Light ..	Barrett, E. ..	c/o J. Patterson, Lilydale-road, Healesville
840	,, of Lorne	4	Draught ..	Waddell, A. ..	Cann River
696	Marshal Clyde ..	A	,, ..	Fraser, R. S. ..	Birchip
204	Marvin's Heir ..	A	Light ..	Cantwell, J. ..	Flagstaff Hotel. Dudley-st., West Melbourne
539	Master Brigham ..	A	Pony ..	Kiely, P. ..	Edi Upper
238	,, Brook ..	3	Light ..	Beattie, A. ..	Tungamah
306	,, Wattee ..	A	Draught ..	Brock Bros. ..	Moe
77	May Duke of Penniwells	3	Pony ..	McLean, Mrs. D.	Irving-road, Toorak

* For names of stallions (registered prior to 30th September, 1926) beginning with any of the initial letters from A to L, see this *Journal* for December, 1926, pp. 755–766.

STALLION REGISTER, 1926-27—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
288	Mayland of Pennicwells	3	Pony ..	Maclellan, Mrs. J.	241 Dandenong-rd., Windsor
601	McAgain ..	A	Draught ..	Pilgrim, H. E. ..	Winiam
783	Medbourne Prince	A	,, ..	McNaughton, E.	Wycheproof
620	Meredin ..	4	,, ..	Roberts & Dennis	Cohuna
831	Merry Chimes ..	6	Light ..	Hayes, W. A. ..	Haysdale
784	,, Lad ..	A	Draught ..	Gertz, F. C. ..	Murtoa
805	,, Oliver ..	A	Thoro'bred	de Little, E. R. ..	South Caramut
234	,, Prince ..	3	Draught ..	Rogers, B. ..	Mepunga East
886	Metal Bells ..	A	Light ..	Cooke, J. ..	Invergordon P.O., via Numurkah
86	Mid-day ..	6	Pony ..	Bannam, J. ..	Wallacedale
899	Middlemarch ..	A	Draught ..	Egan, M. J. ..	Charlton
228	Middlerigg Referee	A	,, ..	Lindner, C. ..	Murtoa
307	,, What's Wanted	A	,, ..	McKoy, E. ..	Wodonga
329	Mikado	5	Thoro'bred	Turnbull, A. G...	Winnieburn North, Coleraine
446	Minature 3rd ..	A	Pony ..	Robertson, T. ..	Moyne Falls, Macarthur
785	Models Herod ..	A	Draught ..	Hutcheson, M. ..	Pine Grove, via Mitiamo
540	Moira Lad ..	A	,, ..	Cunnington, C. R.	Bamawm Extension
10	Mont Harold ..	6	Light ..	Curtis, W. ..	Glenwaverley P.O.
603	Montrae Bold ..	A	Draught ..	Don, E. ..	Newham
19	Montrose	5	,, ..	Small Bros. ..	Pte. Bag, Birchip
541	Moredun Baron ..	6	,, ..	Tilley, F. ..	Aringa, Port Fairy
449	Ranger	6	,, ..	Mitchell, J. R. ..	Sandford
400	Morocco Chief ..	5	,, ..	Arnold, A. ..	Werrigar East, Warracknabeal
308	,, Lad ..	A	,, ..	Parish, Mrs. E. ..	Horsham
372	Mossdale Defiance	3	,, ..	Meyer, J. ..	Kaniva
30	Mountain Twigg ..	5	Pony ..	Medlyn, J. H. ..	St. Arnaud
419	Move On ..	5	Light ..	James, R. J. ..	Walpeup
772	My Chimes ..	6	,, ..	Cromie, J. M. ..	Swan Hill
278	Napoleon ..	A	Draught ..	Lewis, S. J. ..	P. B., Maldon
447	Native King ..	5	,, ..	Hinch, F. ..	Goroke
52	Nelson Chief ..	3	,, ..	Morrish, L. ..	Bullarook
557	Nether Craigends	4	,, ..	Thornton, T. ..	Waaia
773	Netherhall ..	4	,, ..	Ferguson, J. B...	Waubra
309	Newfield's Baron	A	,, ..	Coe Bros. ..	Coleraine
604	,, Pride ..	A	,, ..	Martin, J. M. ..	Aubrey, via Warracknabeal
605	Newton Again ..	6	,, ..	Hodgson, H ..	Lillimur
859	,, Bold ..	A	,, ..	King, L. J. ..	Quambatook
697	Lad ..	A	,, ..	Skinner, T. N. ..	Bordertown, S.A.
310	,, Stewart	A	,, ..	Borgelt, A. H. ..	Nhill
311	Newton Style ..	A	,, ..	Currell Bros. ..	Cowley's Creek
906	Newton's Moddle	3	,, ..	McClay, C. W. ..	Barraport P.O., via Boort
713	,, Pride ..	3	.. ..	Ibbs, J. T. ..	Camperdown
606	,, Sensation	A	,, ..	Reynolds, J. A. ..	Bamawm
281	Noble Glen ..	6	,, ..	Nagoreka, W. ..	Tarrington
607	Non Pariel ..	A	,, ..	Roberts, J. ..	Calder's Bag, via Lake Rowan
89	Northcote's Pride	3	,, ..	Holdsworth, J. ..	Jung

STALLION REGISTER, 1926-27—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
71	Novel Song ..	A	Thoro'bred	Robbie, W. A. ..	Wangaratta
312	Nutshell ..	A	Pony ..	Whitehead, H. W.	Toronga Hill, Port Fairy
127	Oakwood ..	A	Draught ..	Nixon & Sons, R.	Correen, N.S.W.
451	October ..	A	Thoro'bred	Sadler, Jos. ..	Noorat
518	Odd Pictures ..	4	Light ..	McAlpine, Mrs. E.	Toolamba P.O.
738	Once Again ..	5	Pony ..	Wade, A. P. ..	Glen Alvie
264	Onward Baron Belmont	3	Draught ..	Ferguson Bros. ..	Murmungee
608	Onward O ..	A	,, ..	Adams, H. D. ..	Yielima
291	Orion	A	Thoro'bred	Larsen, P. ..	Eskdale
454	Ormond Dale ..	A	Draught ..	Dixon, W. ..	Donald
531	Oscar Siam ..	5	Light ..	Fehring, H. ..	Cohuna
609	Osiris	A	,, ..	Scarse, H. ..	Melton
801	Our Marvin ..	A	Pony ..	Jenkins, Mrs. G. G.	Cudgee
455	Owyhee Chief ..	A	Light ..	Shanahan, J. ..	4 Corsair-street, Richmond
60	Pat Letty ..	3	Draught ..	Gibbins, W. H...	Galah
324	Pat of Transy ..	A	Pony ..	Gibson, Miss D...	cr. Toorak and St. George's-road, South Yarra
116	Patrician ..	A	Draught ..	Gibbins, W. ..	Galah
912	Patrick Howard ..	4	,, ..	Holland, W. G...	c/o Mills, P. B., Warracknabeal
628	Patriot II. ..	5	,, ..	Ewing, J. W. ..	Penshurst
691	Patriotic ..	A	,, ..	McMillan, D. A.	Rainbow
602	Patrus	5	Thoro'bred	Biggar, R. ..	Waaia
313	Perlyn	A	Light ..	Bowden, F. W...	Won Wron
369	Periscope ..	A	,, ..	Ervin, J. & M. ..	Pyramid
610	Peter	A	,, ..	Carroll, J. ..	Myrtleford
698	,, Eden ..	A	Draught ..	Dyer, John ..	Benambra
872	Pettadale ..	A	,, ..	McIlraith, B. ..	Watchem
69	Plain Voyage ..	A	Light ..	White, J. ..	Inglewood
901	Playfair ..	3	Draught ..	Feeny, J. J. ..	Swanwater
542	Pleasant Voyage..	A	Light ..	Ohlin, W. ..	Gooramadda
314	Poilu	A	Pony ..	Cross Bros. ..	Goroke
146	Politician ..	A	Light ..	Wood, W. J. ..	Moyhu
611	Preble	A	Pony ..	McKenzie, A. F.	Hexham
315	Predominate ..	A	Light ..	Kelly & Co., C...	Barwidgee, Caramut
67	Premier Dale ..	4	Draught ..	Penno Bros. ..	P. B., Boort
457	,, Jack ..	A	,, ..	Vaughan, V. ..	Condah
418	,, Mark ..	5	,, ..	Weatherley, L. J.	Woolongoon, Mortlake
547	Premier Montgomery of Willow Bank	A	,, ..	Doherty, E. ..	Congupna-road
804	Present	3	Pony ..	Adams, J. G. ..	Woodlands, Mansfield
619	Pride of Clutha ..	A	Draught ..	Lingenberg, J. ..	Foxhow
699	,, ,, Lochiel ..	A	,, ..	Ovens, J. T. ..	Cooma, via Byrneside
85	,, ,, Winsome	3	,, ..	Thomas, F. C. ..	Blackheath
88	,, ,, the Lake	3	Thoro'bred	Blake, R. F. ..	Green Lake
241	,, ,, ,, South	A	Draught ..	Hill, H. G. ..	Nurrabil
316	Prince Bellinda ..	A	Light ..	Lock, O. ..	Thorpdale
72	,, Buchlyvie	5	Draught ..	Pennel, G. W. ..	cr. New and Cole streets, Elsternwick

STALLION REGISTER, 1926-27—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
613	Prince Charles ..	A	Pony ..	Dawkins, J. ..	Colac
26	,, Charming	3	Draught ..	Allan, P. ..	Thalia, via Wycheproof
149	,, Coupar ..	A	,, ..	Henderson, J. ..	Leongatha South
207	,, Dale ..	5	,, ..	Downey & Son, J.	Wallace
317	,, Douglas ..	A	Light ..	Martin, P. ..	Molesworth
832	,, Ecuador ..	A	Thoro'bred	Hender, F. ..	Broomfield
700	,, Maurice ..	A	Light ..	Morrissey, O. V.	Molesworth P.O., via Yea
822	,, Newton ..	4	Draught ..	Jamieson, Jno. ..	Chinto P.O., via Wallan
318	,, Que ..	A	Pony ..	Nicol, Mrs. L. ..	Heatherton-road, Dandenong
319	,, Wigton ..	6	Draught ..	Archibald, H. ..	Sale
51	,, William ..	3	,, ..	Lewis, W. ..	Pootilla P O
754	,, Wonga ..	4	Pony ..	Rogers Bros. ..	Jacka Jacka, Tooan
320	Quality	A	,, ..	Callow, A. E. ..	520 Mair-street, Ballarat
191	Quatta's Belmont	A	Draught ..	Lindsay, M. ..	Barandudna
458	Radium ..	A	Light ..	Manifold, Jno. ..	Purrumbete, Weerite
498	Reality II. ..	6	Pony ..	Horswood, W. ..	Emerald
321	Real Scotch ..	A	Draught ..	Rumbold, J. ..	Laanecoorie
437	Realto	3	Pony ..	Darcy Bros. ..	Greendale
839	Redwin ..	5	Light ..	Harris, J. ..	Lucknow
802	Regis	A	Draught ..	Manifold, E. ..	Wiridgil, Camperdown
548	Review	6	,, ..	Donnan, J. ..	Watchupga
460	Ribbon Wheel ..	A	Light ..	Vaughan, V. ..	Condah
273	Richard Dillon ..	4	,, ..	Lewis, S. J. ..	Baringhup
139	Rising Star ..	A	Draught ..	Hood, J. W. ..	Polkemmet P.O.
376	,, Sun ..	4	,, ..	O'Bree, J. ..	Bower Bank, Piangil
332	Rizzio	A	Thoro'bred	Currie, H. A. ..	Burrumbeet
702	Robert Bruce ..	A	Draught ..	Gregerson, H. ..	Benalla
614	Robinhood ..	5	,, ..	Bull, T. ..	Ultima
615	Rocket	A	Pony ..	Thomson, A. W.	Hamilton
833	Ronyas Bells ..	A	,, ..	Marshall, W. M.	Lancefield
49	Rosedale ..	4	Draught ..	Liesfield, C. J. ..	Rainbow
43	,, ..	5	,, ..	Müller, P. H. ..	Box 88, Dimboola
322	Roseneath Baronet	A	,, ..	Trimble, R. ..	Rutherglen
237	,, Donald	5	,, ..	Creighton, A. ..	Tungamah
370	,, Footprint	5	,, ..	Jamieson & Sons, H.	North Burrajaa, via Corowa
703	Roseworthy ..	A	Light ..	Clifford, A. ..	Donald
704	Roy	A	Pony ..	Cleeland, J. B. ..	Newhaven, Ph. Isl.
849	Royal	5	Draught ..	May, Jas. ..	Joel Joel, via Stawell
705	Royal Belmont ..	A	,, ..	Egan, J. M. ..	Woodleigh
90	,, Brigham ..	6	Pony ..	Hinkley & Son, E. W.	Becac
552	,, Bute ..	6	Draught ..	Luckie, G. ..	Springhurst
618	,, Charm ..	A	,, ..	Smith, T. H. ..	Lalbert
323	,, Chief ..	A	,, ..	Burns, W. G. ..	Lemon Springs, Goroke
882	,, Churchill ..	A	,, ..	Kennedy, A. ..	Arcadia
806	,, Comedy ..	A	Thoro'bred	Gannon, J. A. ..	Leongatha
553	,, Craig ..	A	Draught ..	Trimble, H. ..	Pine Lodge
11	,, ,, ..	3	,, ..	Philbey, C. G. ..	Bews, South Aus.

STALLION REGISTER, 1926-27—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
84	Royal Dale ..	3	Draught ..	Maddern, T. ..	Blackheath
627	,, Derby ..	4	,, ..	Siden, T. ..	Tatura
461	,, Douglas ..	A	,, ..	Dugdale, Jno. ..	Myrniong
2	,, ,, ..	3	,, ..	Stokes, A. ..	3 Bloomberg-street, Abbotsford
279	,, Duke ..	A	,, ..	Dennert, executors late C. W.	Hamilton
243	,, Fashion ..	A	,, ..	Toogood, J. ..	Hawkesdale
166	,, Flush ..	A	,, ..	Colton, M. ..	Terang
399	,, Gartley II.	4	,, ..	Sleep, S. ..	Box 132, Warracknabeal
325	,, Garvin ..	A	,, ..	Brown, F. ..	c/o A. E. Bratley, South Geelong
521	,, George ..	3	,, ..	Archibald, G. W.	Kyabram
3	,, Main ..	A	,, ..	Greig, D. C. ..	c/o Campbell Adamson, Pty. Ltd., City Horse Bazaar, Melbourne
57	,, Northcote	3	,, ..	Hicks, Jno. ..	Kaniva
5	,, Plaid ..	3	,, ..	Cross, S. L. ..	Minimay
452	,, Ribbon ..	A	,, ..	Morris, Jas. ..	Piangil
633	,, Robin ..	A	,, ..	Boyle, J. ..	Verdant Vale, North Boort
464	,, ,, ..	A	,, ..	Fitzpatrick, M. ..	Barrakee
73	,, Scotch ..	3	,, ..	Smith, R. H. ..	Willenabrina
466	,, Seal ..	A	,, ..	Dugdale, Jno. ..	Myrniong
708	,, Sheperd ..	A	,, ..	Heard, T. A. ..	Noradjuha
272	,, Simon ..	6	,, ..	Cox, A. E. ..	Alma P.O.
634	,, Style ..	A	,, ..	Morrissey, P. ..	Molesworth
113	,, Success ..	A	,, ..	Edsom, W. ..	Dart Dart
368	,, Viceroy ..	5	,, ..	Bellville, J. ..	Watchem
66	,, ,, ..	4	,, ..	Buchanan, G. ..	Box 62, Boort
873	Royalty ..	A	Pony ..	Coe, W. ..	Coleraine
326	Rufus	6	Draught ..	Kent, Mrs. S. E.	Sheep Hills
327	R. W. Estell ..	A	Light ..	Anderson, Geo. ..	Trawalla P.O.
93	Safe Voyage ..	A	,, ..	Meyers, V. ..	Lockwood
379	Salvation ..	3	Draught ..	Purves, P. B. ..	Noonameena Tol Tol, Mallee
167	Sam Huon ..	A	Light ..	O'Brien, J. P. ..	110 Powlett-street, East Melbourne
115	Sandy's Fashion ..	A	Draught ..	Haines, E. ..	Gerang Gerung
795	Scot Free II. ..	3	Pony ..	Millar, T. M. ..	Sale P.O.
782	Scotch Laddie ..	5	Draught ..	Christenson, H. F.	Tyers P.O.
263	,, ,, ..	5	,, ..	Carton, L. ..	Laceby South
428	,, Mixture ..	4	,, ..	Mitchell, W. ..	Woomelang
144	,, Prince ..	5	,, ..	Evans Bros ..	Redcamp, Moyhu
34	,, Thistle ..	5	,, ..	Bagnell, J. ..	Mologa
364	Scotchie ..	5	,, ..	Broom, A. ..	Eastville, via Maldon
749	Scotland Again ..	3	,, ..	McDonald, A. ..	Mount Wallace
259	,, ,, ..	5	,, ..	Witherow, T. J.	Wangaratta South
53	Scotland's Dignity	3	,, ..	Bodey, D. L. ..	Jung
75	,, Pride ..	3	,, ..	Nairn, J. ..	Box 44, Ouyen
874	,, Signet	A	,, ..	Ramsay, N. ..	Newbridge
168	,, Viceroy	A	,, ..	Parker, T. ..	Pepper's Plains
555	,, Viceroy's First	A	,, ..	Witney, W. J. ..	Aubrey, via Warracknabeal
169	,, Victory	6	,, ..	Peucker, A. ..	Sea Lake

STALLION REGISTER, 1926-27—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
616	Scotsdale ..	3	Draught ..	Crozier, W. ..	South Morang
170	Scottie	A	,, ..	Fullam, T., junr.	Torrumbarry P.O.
233	Scottish Banker ..	6	,, ..	Byrne, G. L. ..	Kewell North
143	,, Chief ..	4	,, ..	Bourke, J. ..	Edi
244	,, Laird ..	A	,, ..	Edson, T. ..	Glenorchy
229	,, Prince ..	A	,, ..	Buckley, R. D. ..	Glenlea, via Gerang
467	Scotty	A	,, ..	Roulston, J. ..	Muskerry, E.
27	,, ...	4	,, ..	Cassidy Bros. ..	Ouyen
365	Scotty's Pride ..	4	,, ..	Gillan, A. ..	Sea Lake
171	Selection ..	A	,, ..	Watson, C. ..	Milndale, via Glen Forbes
287	Selkirk	A	Light ..	Scott, A. ..	Elmore
636	Several	A	Thoro'bred	Winter-Cooke, S.	Hamilton
709	Seymour ..	A	Draught ..	Cleeland, J. ..	Newhaven, Ph. Is.
890	Shandon Bells ..	A	Light ..	Long, T. ..	Nelson-st., Nhill
711	Shantella ..	6	Draught ..	Roulston, D. H.	Myola, via Tooleen
469	Shanter Junior ..	6	,, ..	Muhleison, C. ..	Wooreen, via Leongatha
404	Shepherd Again ..	6	,, ..	Lindner, C. ..	Murtoa
432	,, King ..	4	,, ..	Skehan, W. ..	Corowa
637	Shepherd's Boy ..	A	,, ..	Kelly, I. ..	Korong Vale
172	Sheriff Huon ..	A	Light ..	Thomas, V. ..	6 Hope-street, West Richmond
908	Shoopiltee of Shetland Heights	3	Pony ..	Maclellan, Mrs. J.	241 Dandenong-rd., Windsor
285	Siam	A	Light ..	Glenn, J. ..	Tylden
787	Silver Claim ..	A	Thoro'bred	Hutcheson, M. ..	Pine Grove P.O., via Mitiamo
639	Silverlight ..	A	Pony ..	Jarvis, R. J. ..	Cudgewa
444	Silver Print ..	3	Draught ..	Bodey, D. L. ..	Jung
208	Sir Andrew ..	5	,, ..	Mitchell, W., junr.	Watchupga
807	,, Armadale ..	A	,, ..	Lincoln, J. ..	Portarlington
712	,, Bute ..	A	,, ..	Thomson, J. M. ..	Stratford
556	,, Clyde ..	A	,, ..	Taylor, S. J. ..	Lake Boga
917	,, Don Pedro ..	A	,, ..	McKee, J. ..	Clarendon P.O.
808	,, Douglas Haig	A	,, ..	Lincoln, J. ..	Portarlington
558	,, Everest ..	A	,, ..	Ralston, A. ..	Lucknow P.O.
640	,, Fabric ..	A	,, ..	Allitt Bros. ..	Diapur
470	,, George ..	A	Pony ..	Russell, J. K. ..	Barunah Plains, Hesse
367	,, ,, Robin	3	Draught ..	Bleakley, S. H. ..	Horsham
788	,, Harold ..	A	Pony ..	Adams, Geo. ..	Shepparton P.O.
366	,, Major George ..	4	Draught ..	Phillips, W. ..	The Rock, N.S.W.
187	,, Regulus ..	A	,, ..	Ellwood Bros. ..	Wallace
726	,, Richard III. ..	4	Pony ..	Henderson, W. ..	Grasmere
860	,, Roderick ..	A	Draught ..	Byrne, W. ..	Trentham
714	,, Rupert ..	A	,, ..	Kelly, Geo. ..	c/o Mailman, Rochester
876	,, Thomas ..	A	,, ..	Lyon, W. H. ..	The Grange, Sale
46	,, Walter ..	3	,, ..	Elsom, W. ..	Dart Dart
790	,, Walter Burnside	6	,, ..	Schroeder, F. ..	Carina P.O.
715	,, Wilfred ..	A	,, ..	Burns, Mrs. E. ..	Silvermine-road, St. Arnaud
809	,, William ..	A	,, ..	McQueen Bros. ..	Waubra
671	Slip Knot ..	5	,, ..	Russell, executors of late J.	Barunah Plains Hesse

STALLION REGISTER, 1926–27—*continued.*

Cert. No.	Name.	Age	Class.	Owner.	Address.
		Yrs.			
918	Snowdrop ..	A	Light ..	Staughton, A. J.	Terang
260	Southern Lad ..	A	Draught ..	McKenzie, G. ..	Pullut
173	„ Star ..	A	„ ..	Maher, J. ..	Nyrraby, via Chillingollah
879	Sportsman's Hero	A	„ ..	Kennedy, A. ..	Arcadia
717	Springbank Lawrence	A	„ ..	Crawford, W. H.	Hamilton
630	Springdale ..	5	„ ..	Wileman, H. ..	Sunbury
174	St. Aidan ..	A	Light ..	Cribbes, M. ..	Faraday
175	St. Mark ..	A	Draught ..	George, C. W. ..	Heatherbank, Beulah
472	St. Simon ..	A	„ ..	Butler, G. J. ..	Carisbrook
643	Stanley May ..	A	„ ..	Ladson, G. R. ..	Mincha W.
875	Starlight ..	A	„ ..	Meek, G. ..	Nhill
473	Stirling Prince ..	A	„ ..	Cunning, A. ..	Beauchamp P.O., via Mystic Park
475	Stockman's Lad ..	A	„ ..	Schulz, J. F. A...	Lake Hindmarsh, Jeparit
877	Straightaway ..	A	Light ..	Allen, T. ..	Narrewillock, via Glenloth
861	Stylish Bells ..	A	„ ..	Sterritt, Mrs. N. M.	1005 South-street, Ballarat
45	Sudbourne's Chief	5	Draught ..	Stray, G. H. ..	Tabilk
718	Sugar King ..	A	Thoro'bred	Weekes, D. J. ..	Stratford
719	Sum Time ..	6	Draught ..	Nicholson, R. ..	Pirlta P.O.
537	Sunbeam ..	3	„ ..	Wilson Bros. ..	Cohuna
176	„ ..	A	Thoro'bred	Treasure, H. L...	Stratford
177	Sunbury ..	A	Light ..	Nolan, T. C. ..	Carinya, Tarrawingee
181	Sunny Simon ..	A	„ ..	Swan, A. R. ..	Avenel
64	Suprise Voyage ..	3	„ ..	McDonald, J. ..	Ultima
433	Sweet Murillo ..	A	Thoro'bred	Parslow, E. T. ..	Omeo
476	Taffy	A	Pony ..	Sargent, J. ..	Yanac
178	Take Bells ..	A	Light ..	Ferguson, J. ..	Redesdale
179	Tax Payer ..	A	Pony ..	King, V. ..	Scott's Creek
205	Tennessee Direct..	4	Light ..	Matchett, R. ..	Mitchell-street, Bendigo
477	Territorial ..	A	Draught ..	Thomas, R. M. ..	N. Devon
915	The Admiral ..	4	Light ..	Davis, G. ..	Elmore
479	„ Banker ..	A	Draught ..	Templeton, A ..	Coleraine
889	„ Cavalier ..	3	„ ..	Phillips, J. M. ..	Congupna-road
196	„ Colonel ..	A	„ ..	McDonald Bros.	Mortlake
183	„ Crown ..	A	„ ..	Altmann, E. A...	Pullut
721	„ Design ..	A	Light ..	Carter, W. J. ..	438 Barkley-street, Elwood
431	„ Dux ..	5	Draught ..	Hargreaves, J. ..	Dederang
644	„ Fashon ..	A	„ ..	Dyson, R. ..	Dromana
729	„ Grocer ..	5	Light ..	Lesser, C. A. ..	Coleraine
722	„ Joker ..	A	Pony ..	Chambers, D. ..	Mologa
549	„ Roster ..	A	Light ..	Lesser, C. A. ..	Coleraine
796	„ Toff ..	4	Pony ..	Kenyon, R. M. ..	Sale
724	„ Voyager ..	A	Light ..	Robinson, J. T...	The Grange, Tongala
232	Theale Padlock ..	3	Draught ..	McLeod, W. ..	Lucknow
31	Thornfield Craig ..	3	„ ..	Leeder, E. J. ..	Cope Cope
725	Thoughtful ..	A	Pony ..	McIntosh, P. ..	Ondit
184	Tim Anton ..	6	Thoro'bred	Coy, F. C., junr.	Bookar, via Camperdown

STALLION REGISTER, 1926–27—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
810	Timely Direct ..	A	Light ..	Crome, J. M. ..	Gray-street, Swan Hill
646	Toby	A	Pony ..	Thompson, A. W.	Monival Station, Hamilton
35	Tom Mix ..	6	Light ..	Wall, M. ..	Pyramid Hill
800	Top Score ..	5	Draught ..	Irvine, T. W. ..	Yarra Glen
180	Tra George ..	A	Thoro'bred	Perridge, T. ..	Sherwood Farm, Tooradin
791	Tracey Voyage ..	A	Light ..	Mackin Bros. ..	Korong Vale
811	Trafalgar ..	A	Thoro'bred	Mitchell, executors of late W. E.	Toowong Hill, Corryong
559	Trelawney Time ..	A	Draught ..	Larcombe, R. H.	Clifford Est., Mount Moriac
74	Trelawney's Pride	5	,, ..	Nairn, J. ..	Box 44, Ouyen
515	Tremenheere Craig	5	,, ..	Davies, C. N. ..	Rochester West
377	Tresco	A	Light ..	Bowman, A. E...	Bethanga Park, Ebden
182	Tressayr ..	A	Thoro'bred	Widdicombe, F.	Gymbowen
926	True Blue ..	A	Draught ..	Malseed, P. T. R.	Dartmoor
629	Tuxedo Rock ..	5	Light ..	Pell, A. ..	Kyabram
197	Udale	A	Draught ..	Holdsworth, J ..	Jung Jung
261	,, Jack ..	A	,, ..	Middleton, P. O.	Carron
927	Vanguard ..	A	,, ..	Lord, G. & W...	Flynn
843	Vic McKinney ..	4	Light ..	Morris, C ..	Upper Ferntree Gully
480	Vice Regal ..	6	Draught ..	Parish, W. G. ..	c/o Wilson and Bolton, Horsham
63	,, ,, ..	3	,, ..	Walker, J. A. ..	Lake Boga
198	,, Royal ..	A	,, ..	Walker, Mrs. J. B.	Swan Hill
50	Viceroy Yet ..	5	,, ..	Liesfield, C. ..	Rainbow
743	Viking	A	Light ..	Turnbull, A. G...	Winton, Horsham
707	,, of Methven	A	Pony ..	Maclellan, Mrs. J.	241 Dandenong-rd., Windsor
199	Vin Direct ..	A	Light ..	Mulfahey, J. D...	96 Lewisham-road, Windsor
813	Volunteer ..	A	Pony ..	Waters, T. B. ..	Corryong
903	Vue Dale ..	4	Draught ..	Quick, N. W. ..	Mollonghip
391	Waikoura ..	3	,, ..	Mitchell & O'Brien	City Horse Bazaar, Melbourne
18	Waironga Clyde ..	5	,, ..	Connelly Bros. ..	Whirley, via Birchip
381	Waironga's Model	5	,, ..	Yetman, J. ..	Patchewollock
200	Waituna ..	6	,, ..	Greaves, S. A. ..	Narre Warren
390	Wakanui Chimes ..	4	,, ..	Mitchell & O'Brien	City Horse Bazaar, Melbourne
561	Wakapero ..	A	,, ..	Jenner, G. E. ..	Kerang East P. B.
21	Wallace Dale ..	4	,, ..	Butler, G. J. ..	Carisbrook
235	,, Park ..	5	Thoro'bred	Walsh, F. H. ..	Melton South
844	War Lord ..	4	Draught ..	Bransgrove, J. ..	Wood-street, Preston
486	Warrigal ..	A	Pony ..	Baulch, S. S. ..	Orford
657	Wee Charlie ..	3	,, ..	Dawkins, J. T. ..	Colac
289	,, Jim ..	A	,, ..	Kettyle, J. R. ..	Wesley Hill, Castlemaine
206	Welsh Flyer ..	A	Light ..	Reid, P. J. ..	Milawa
922	Weralla ..	6	Thoro'bred	McLeod, E. ..	Yarram
113	What Oh ..	A	Pony ..	Chamberlain, H.	Werribee
37	What's Wanted ..	3	Draught ..	Coats, V. ..	Jeffcott

STALLION REGISTER, 1926-27—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
236	White Prophet ..	A	Thoro'bred	Cooper, W. R. ..	Pakenham East
15	,, Silk ..	3	Draught ..	Cunningham, A.	Miram
623	Widgiewa Alick ..	3	,, ..	Jackson Bros. ..	Pirie P.O., via Waaia
816	,, Belmont	6	,, ..	Perkins, C. H. ..	Rainbow
910	,, Black-wood	3	,, ..	Gillis, A. ..	312 Racecourse-rd., Newmarket
834	,, Cavalier	A	,, ..	Gordon, A. ..	Broughton, via Nhill
209	,, Chief ..	A	,, ..	Lynn, S. J. ..	Orbost
848	,, Dale ..	4	,, ..	Bunworth, J. ..	Culgoa
435	,, Edward	A	,, ..	Down, W. G. ..	Koonda P.O., via Violet Town
192	,, Fashion	A	,, ..	Oliver, W. & L...	Diggora West
845	,, Fingal	4	,, ..	Mills, J. ..	Warracknabeal P.O.
294	,, Ivo ..	A	,, ..	Wilkinson, W. G.	Yarrawonga
760	,, Leo ..	3	,, ..	Gray, J. S. ..	Sheep Hills
619	,, Mark ..	3	,, ..	Christie, J. S., junr.	Katunga
485	,, Marshal	A	,, ..	Christie, Jno. ..	,,
551	,, Ninian..	5	,, ..	Mawson, W. ..	Cohuna
911	,, Norseman	3	,, ..	Wilkinson and Young	Yarrawonga
647	,, Sapper	A	,, ..	Allen, G. C. ..	Broughton, via Nhill
527	,, Stephen	5	,, ..	Hewitt & Sons, C.	Werrigar East, Warracknabeal
862	Wighon's Pride ..	A	,, ..	King, L. J. ..	Quambatook
484	Wighonshire ..	A	,, ..	Cobain, J. ..	Sale
210	William of Orange	A	Thoro'bred	Gray, A. J. ..	164 Burke-road, East Malvern
40	,, Wallace	5	Draught ..	Bish, E. ..	Chirrup
438	Willie Craig ..	A	,, ..	Leishman, A. T.	Kingston
621	,, McBride ..	3	,, ..	Moroney, T. ..	Barnedown
581	,, Rose ..	3	Light ..	Read, E. P. ..	Goornong
744	Wiltshire ..	A	,, ..	Wood, C. ..	Minyip
385	Windermere Sensation	5	Draught ..	Robson, T. ..	Crow's Nest, N.S.W.
649	Windlesham ..	A	Thoro'bred	Hillman, W. T...	Queen-st., Bendigo
501	Winning Hit ..	5	Draught ..	Hargreaves, J. ..	Eskdale
550	Winsome Chief ..	A	,, ..	Peterson, C. R...	Kellalac
348	Wonga	A	Light ..	Dickenson, L. E.	Natimuk
562	Worthy Mac ..	A	Draught ..	Elliott, J ..	Kyabram
430	Xantho ..	4	Thoro'bred	Whitehead, J C.	Goodwood, Minhamite
661	Yarra Dale ..	3	Draught ..	Bell, J. T. ..	Gulf Station, Yarra Glen
817	Yeneda	A	Thoro'bred	Hutchison, D. A.	Yan Yean
76	Young Baron Bold	5	Draught ..	Gervasone, N. ..	Ballarat
863	,, Brigham ..	A	Pony ..	Craig, W. J. ..	Cobden
650	,, Clarionet..	A	Light ..	Mitchell, Jno. ..	Karnak
331	,, Clydeside	A	Draught ..	Jager, H. ..	Box 43, Swan Hill
212	,, Comet ..	A	Pony ..	Adkin, T. ..	Greyacres, Korumburra
727	,, Coronation	A	Draught ..	Bennett, W. J. ..	Cannie Rly. Station
483	,, Dan ..	A	,, ..	Haggbloom, J. V.	Sea Lake
190	,, Dunsdy Victor	4	,, ..	Walker, E. A. ..	Cowangie
652	,, Emulator	A	Pony ..	Defence Dept. ..	Melbourne
835	,, Flashlight	A	Draught ..	Rawson, T. ..	Omeo P.O.

STALLION REGISTER, 1926–27—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
482	Young Ki Ki ..	A	Pony ..	Robertson, T. ..	Moyne Falls, Macarthur
898	,, Lad ..	A	,, ..	Gillett, W. H. ..	Lara
213	,, Linkwood	A	Draught ..	Peverill, J. H. ..	Charlton
481	,, Lymney Champion	A	,, ..	Penaluna, W. H.	Boolarra
728	,, Major ..	A	,, ..	Gould, J. ..	Boort
730	,, Pepper ..	A	Pony ..	Thornley, executors of late N.	Hawkesdale
731	,, Recruit ..	A	,, ..	Waters, E. W. ..	Echuca East
778	,, Robin ..	4	Draught ..	Fraser, G. A. ..	Addington
38	,, Sapper ..	3	,, ..	White, H. ..	Cowangie
429	,, Scotchman	4	,, ..	Buckle, G. ..	Rochester
214	,, Shepherd	A	,, ..	Chapman, G. ..	Minyip
745	,, Simon ..	6	,, ..	Sheehan, W. ..	Muckleford
185	,, Starling ..	A	Light ..	Regan, W. ..	6 Montgomerie-st., Moonee Ponds

REMINDERS FOR FEBRUARY.

CATTLE.—Provide succulent feed and plenty of clean water easy of access; also shade, and salt lick in trough. Have each cow's milk weighed and tested for butter fat regularly. Rear heifer calves from those that show profitable results. Give milk at blood heat to calves. Keep utensils clean or diarrhœa will result. Do not give too much at a meal for the same reason. Give half-a-cup of lime-water per calf per day in the milk. Let them have a good grass run or lucerne, or half-a-pound of crushed oats in a trough. Dehorn all dairy calves except those required for stud or show purposes. Keep bulls away from cows. Write for Bulletin 52.

PIGS.—Sows about to farrow should be supplied with short bedding in well-ventilated styes. All pigs should be provided with shade and water to wallow in. There will be plenty of cheap feed available now, and there is a good margin between cost of feed and price for fat pigs. Read *Bulletin* No. 16, and special articles in *Journal of Agriculture* for May to October, 1926, inclusive.

SHEEP.—Ewes with a predominance of British blood do not come regularly into season until the present month. This is particularly the case in Gippsland and South-western Victoria, if these strong-woolled ewes were bred in the cool wet districts. Most of the pure-bred ewes of British origin very seldom take the ram until February, March, or even as late as April, with the possible exception of studs bred in the north, or recently imported.

Lambs dropped in July, August and September, may suit certain districts in the south, but early lambs are most profitable in normal years north of the Divide. To breed out this late-lambing tendency, and to procure quality and quantity of wool as well as a good framed sheep, use well-bred and well-woolled large-framed Merino rams on all strong-woolled cross-bred ewes. If the right type of Merino ram is not obtainable at reasonable rates, secure good Corriedales from registered owners. Narrow hard-looking rams are usually active workers, and in a flock of ewes with other rams, they often get the greatest number of lambs. If any such rams are of necessity to be used, keep them back for a few weeks, and join later with the flock after the best of the rams have been running with the ewes for at least three weeks.

The second dipping of sheep affected with tick or louse can be undertaken this month. A good water supply is vital. Provision should be made for prevention against fire and losses by disease or drought, also blow-fly pest.

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PURPLE TOP YELLOW ABERDEEN—Very hardy, superior to many varieties cultivated for the table; 2/6 lb.

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WHITE GLOBE—Very large; 2/6 lb.

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FOSTERTON HYBRID—Most profitable variety in cultivation; a heavy cropper, splendid keeper; 3/6 lb.

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Turnips and Swedes are excellent for Cattle, Horses, Sheep, and Pigs. They are ready late in Autumn, and if pulled and stored can be used during the whole Winter. **Sow 3 lb. of seed per acre.**

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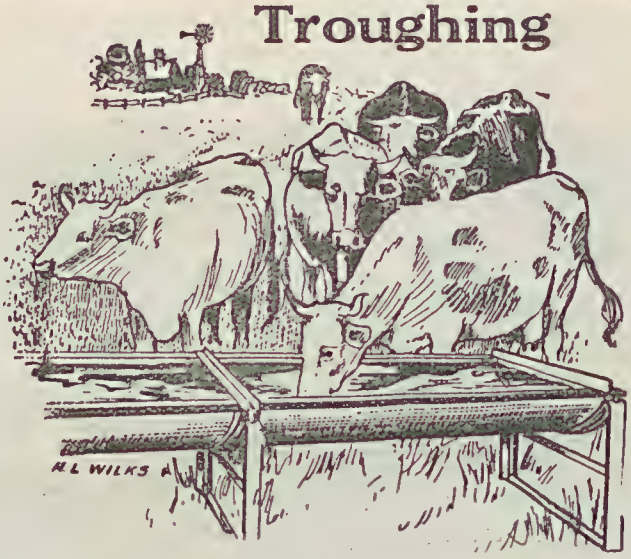

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is set in two or more heavy angle and T steel frames, which forms a most rigid bed and enables "BILLABONG" Troughs to withstand rough usage and hard wear. This Troughing is easily assembled and is made in styles to suit cattle, calves, and sheep, and also a very heavy type is made for pigs. "BILLABONG" Troughing is really worth your full consideration.

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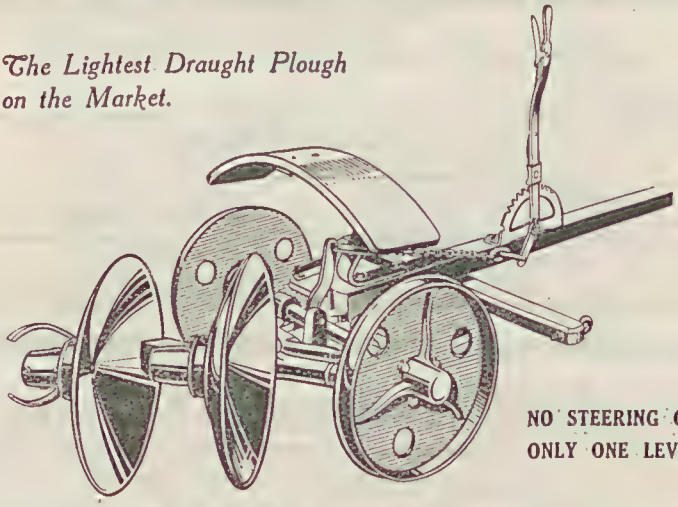

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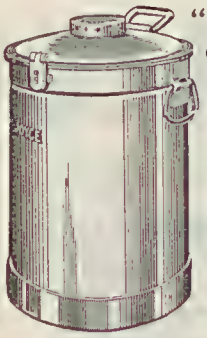

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With this Filler it is quite easy to put 10 ordinary bags into 9 bags.
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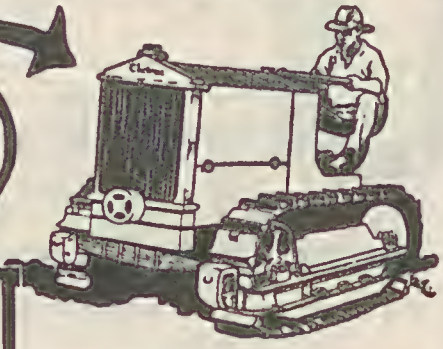

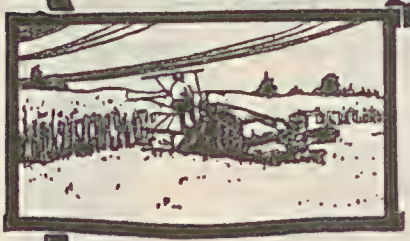

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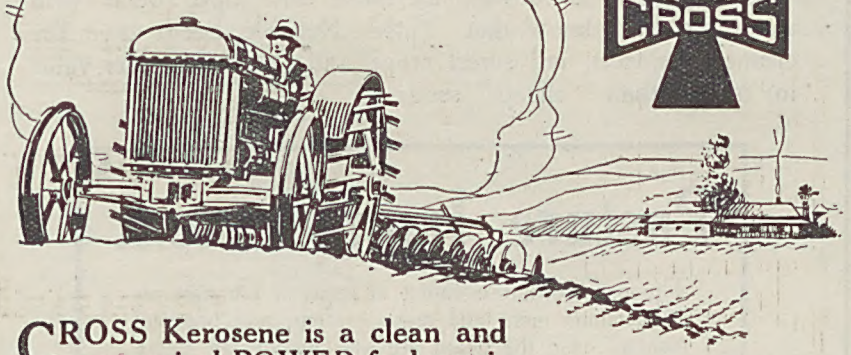

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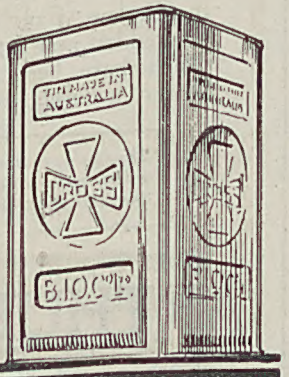

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Of these, Lucerne is undoubtedly the most important, but needs little comment, being so widely and well known. The quick maturing early oats, such as Mulga and Sunrise, are very strongly advocated as a green crop for lambs and lambing ewes. Among the Barleys, Cape and Skinless are well-known. In addition, we secured last year supplies of Trabut and Pryor (two malting barleys), which have been found to be of exceptional value for green fodder, maturing two to three weeks earlier than Cape.

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DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department has now completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter *fat* yielded. Thus a calf from a cow with a 400 lb. butter fat record is sold for 20 guineas, one from a 300 lb. butter fat cow for 15 guineas, and so on. Bull Calves *ex* heifers on their first calf are sold for a set price of 10 guineas.

(For Record of Yields of dams see Red Poll Herd Book.)

SIRES IN USE:

VICTORIA VOLCANO (322 A.)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Tonga (253 A.) by Honingham Archbishop (imp.) 9702 (48 A.A.).

Tonga's butter fat yields for 6 successive lactation periods are as follow:—1916, 341 lb.; 1917, 398 lb.; 1918, 419 lb.; 1919, 479 lb.; 1920, 428 lb.; 1921, 562 lb.

BELLIGERENT (Imported) 11096 (8 A.A.)

Dam's Record (1st milking) 7144 lb. milk.

Dam's Dam's	,,	14533 lb. milk	...	4	years	average	12871 lb. milk.	
Sire's Dam's	,,	10370	,,	... 7	,,	,,	9354	,,
Sire's D. Dam's	,,	9510	,,	... 12	,,	,,	8033	,,
G. Sire's D. Dam's	,,	10215	,,	... 7	,,	,,	9386	,,
G.G. Sire's D. Dam's	,,	12565	,,	... 10	,,	,,	8853	,,
G.G.G. Sire's D. Dam's	,,	10088	,,	... 2	,,	,,	9754	,,

BIT O' 'BACCA (Vol. 3)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Nictitana (311 B.) by Nicotine (69 A.A.).

Nictitana's butter fat records for 6 successive lactation periods are as follow:—1918, 450 lb.; 1919, 396 lb.; 1920, 393 lb.; 1921, 465 lb.; 1922, 524 lb.; 1923, 536 lb.

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

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